

CLASS 431, COMBUSTION**SECTION I - CLASS DEFINITION**

This is the residual class for processes of combustion or combustion starting, and for apparatus peculiarly adapted to burn or ignite materials.

SECTION II - NOTES TO THE CLASS DEFINITION

- (1) Note. A fuel discharge nozzle is a subcombination of basic subject matter of this class if it is specialized for use in combustion solely (1) by discrete means transmitting flame between distinct fuel discharge areas; (2) by flashback preventing or controlling structure (3) by an incandescing component; (4) by means maintaining a reigniting flame; or (5) by flame enclosing, protecting or stabilizing structure.
- (2) Note. Patents issued prior to 1940 have not in all instances been classified by their claimed disclosure so the placement of these patents does not necessarily indicate lines of classification.

SECTION III - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS

See References To Other Classes, below, for information about lines with other classes.

SECTION IV - REFERENCES TO OTHER CLASSES**SEE OR SEARCH CLASS:**

- 44, Fuel and Related Compositions, subclasses 507+ for a match structure; subclass 643 for a residual match striking surface, per se; subclasses 530+ for fuel product of defined shape or structure; and subclasses 542+ for fuel products coated or impregnated for easier ignition.
- 48, Gas: Heating and Illuminating, appropriate subclass, for an apparatus or process for the manufacture, purification, mixing, distribution or storage of heating or illuminating gas without combustion thereof. Also, when a portion of the generated gas is burned to generate the gas and another portion of the generated gas is

purified, fixed or stored, classification is in Class 48.

- 60, Power Plants, subclasses 39.01+ for a combustion product generator, per se, or subcombination thereof peculiarly adapted for power generation, or solely disclosed for such purpose; and appropriate subclasses for a residual device producing mechanical power or thrust from fuel.
- 102, Ammunition and Explosives, subclasses 283+ for a shaped thermic or explosive charge; subclasses 335+ for a device other than a photographic flash device burning a packaged charge containing both fuel and oxidizer for display, amusement flashlight or signal purposes, e.g., flare, etc.; subclasses 335+ for an explosive or thermic charge within a casing; and subclasses 464+ for a fuse, primer or igniter for igniting a thermic or explosive charge. See (1) Note of the class definition of Class 102 for a statement of the types of material used in the devices of this class.
- 110, Furnaces, appropriate subclass for process of burning solid fuel even though the solid fuel be combined with a gas or liquid fuel, the line between Classes 110 and 431 relative to combustion apparatus is: Class 110 takes solid fuel burners that have a feature specialized to the burning of such fuel, e.g., a grate, solid fuel preparer or treater other than a mere preheater, a slag or ash remover, a mechanical feeder such as a conveyor, etc. Class 431 takes gaseous and liquid fuel combustion apparatus and burners utilizing a finely divided fuel dispersed in air in which the mixture merely acts as a fluid fuel stream, even though it is defined by terms such as solid fuel burner, fuel suspension burner, etc. Class 431 also takes candles, jelled fuel burners, magnesium strip burners and illuminating flash devices of the combustion type. Combustion apparatus for or a method of burning liquid waste material, however, is proper in Class 110. Also, search Class 110 for the following furnace elements, subcombinations or appurtenances: subclasses 119+ for spark arrestors; subclasses 145+ for spark and smoke conductors; subclasses 147+ for draft regulators for a furnace; subclasses 165+ for an ash receiving or handling device; subclass 172 for a furnace front; subclasses 173+ for a door specialized for use in a furnace; subclass 181 for a casing or arch specialized for use in a furnace door; subclasses 182.5+ for a conduit specialized to feeding air to a furnace; subclass 184

- for a metal smoke stack specialized for use with a locomotive or portable boiler.
- 122, Liquid Heaters and Vaporizers, appropriate subclasses for a heat generator, (e.g., fuel burner, etc.) specifically related to a closed holder of liquid to be heated, or combined with a specific closed liquid holder. However, when the liquid heated is fed to the burner head of a burner assembly and the closed chamber or conduit is merely an element of the burner assembly, classification is in Class 431.
- 123, Internal-Combustion Engines, appropriate subclass for a device specialized to the production of power in which fuel is burned in an expansible chamber.
- 126, Stoves and Furnaces, for the apparatus for the application of heat, and for the stove and furnace elements specifically provided for in the various subclasses; see particularly subclasses 144+ for a firepot or lining, subclasses 285+ for a damper, and subclasses 307+ for a stove pipe.
- 136, Batteries: Thermoelectric and Photoelectric, subclasses 217+ for a residual thermoelectric generator heated by a pilot burner.
- 137, Fluid Handling, appropriate subclass for a residual fluid handling or feeding invention of general utility. The recitation that a fuel is handled or that the invention comprises a burner does not bar classification in Class 137 where no particulars of a flame holding element nor significant relationship of a flame holder and fuel handler based upon the combustibility of the fuel fed to the flame holder is involved.
- 149, Explosive and Thermic Compositions or Charges, appropriate subclass for an explosive or thermic composition, or charge, e.g., match composition, etc.
- 206, Special Receptacle or Package, subclasses 85+ for a tobacco container with an igniter for said content and subclasses 96+ for a match packet, container or holder.
- 219, Electric Heating, subclasses 260+ for an incandescent type of electrically operated igniter, per se.
- 221, Article Dispensing, subclasses 136+ for an article dispenser combined with an ignition means.
- 236, Automatic Temperature and Humidity Regulation, appropriate subclass for a control system regulating the temperature of a chamber or material where no more of the structure of the means supplying or removing heat is included than is necessary to bring out its relationship to the control system. It is noted that for Class 236 an igniter, flame sensor or pilot burner is a part of the control structure rather than of the controlled temperature modifying burner. It is also noted that a residual apparatus specialized to combustion and having either a broad or specific burner is classified in Class 431 where the operation of the temperature modifying burner is simply initiated or terminated by a broad "off and on" thermostat sensing and responding to the temperature of the chamber or material heated by the burner.
- 239, Fluid Sprinkling, Spraying, and Diffusing, appropriate subclass for subject matter relating to the emission from a fluid handling system in modified flow, of fluid or slurry, and for the emitter member, per se. An indication that a fuel is handled or that the emitted material is burned (e.g., named welding torch, etc.) does not bar classification in Class 239 in the absence of a feature or structure dependent upon the combustion or combustibility of the fuel specializing the invention to combustion.
- (a) The structure listed in Notes to the Class Definition (1) Note above and the following features or elements are among those that distinguish a specialized fuel discharger classifiable in Class 431 from a Class 239 structure: (1) A device for starting combustion at the discharger such as a pilot or igniter even nominally recited. (2) A sensor of combustion heat in, or burner flame at the discharger, controlling feed to the discharger.
- 313, Electric Lamp and Discharge Devices, appropriate subclass for an air gap discharge device (e.g., spark plug etc.), per se.
- 361, Electricity: Electrical Systems and Devices, subclasses 247+ for a residual electrical igniting system.
- 362, Illumination, appropriate subclasses for an illumination device comprising a light source, e.g., a burner etc., combined (1) with a device that encloses the light source and transmits the light therefrom or (2) with a light distributor. However, patents issued prior to 1940, having a conventionally shown light transmitting or distributing device and specific burner structure have been placed in the appropriate burner subclass in Class 431.
- 417, Pumps, subclasses 73+, for a pumping system operated by combustion displacement of the liquid and appropriate subclass for a pumping

- system that may handle fuel where combustion of the material handled is not involved.
- 422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, appropriate subclasses for apparatus for generating a treating agent by burning a combustible material, a combustion or reaction device for purifying a gas, or with means for recovering, mixing, separating, or otherwise handling as a product material formed in the device or residual chemical apparatus.
- 423, Chemistry of Inorganic Compounds, appropriate subclass, for inorganic compounds and nonmetallic elements including their manufacture by chemical reaction, and note especially subclasses 212+ for exhaust gas purification or separation.
- 429, Chemistry: Electrical Current Producing Apparatus, Product, and Process, subclasses 12+ for a battery generating current by feeding a gas into a cell to react with fluids in the cell, (e.g., fuel cell, etc.).
- 432, Heating, appropriate subclass, for a residual method or apparatus for generating heat and applying it to materials.
- 588, Hazardous or Toxic Waste Destruction or Containment, appropriate subclasses for the methods of combustion of hazardous or toxic waste, from any source where a useful product is not produced or obtained.

SECTION V - GLOSSARY

BURNER

Term generic to “burner assembly”, “burner head” and “flame holder”.

BURNER ASSEMBLY

A unitary device or fixture including a flame holder and associated feeding or supporting elements.

BURNER HEAD

A device by which fluent fuel is passed to a combustion space where it forms a flame projecting from the device.

CLEANING

The dislodging of extraneous matter or incrustations.

COMBUSTION

The direct combination of oxygen gas and a burnable substance.

FLAME HOLDER

Generic term for the part of a combustion device confining the flame or supporting the base of a flame. It includes burner heads, the flame supporting portion of wicks, the pots of pot type burners, etc.

FLASH BACK

The spread of flame from a combustion area into a feed passage of a burner head.

FLINT

A body of material that produces igniting sparks when struck. It is generally made of an alloy of iron and cerium.

PILOT BURNER

A small auxiliary unit used to ignite a principal flame holder.

PURGING

The removal of unwanted material.

RETARDER

A device that provides for the delay of completion of performance of an operation after its initiating signal has been given, e.g., dashpot, time delay switch, etc.

SCAVENGING

The flushing out of unwanted gas or gas mixture by another gas or gas mixture.

SHUTDOWN

The term is used in this class to indicate that a combustion device has been stopped and that it cannot be made to operate except by manual intervention.

SUBCLASSES

- 1 This subclass is indented under the class definition. Subject matter including means or steps for causing combustion of a continuing series of intermittent fuel charges which create a peak

combustion followed by a minimum combustion rate, regularly or in definite repeating patterns.

SEE OR SEARCH CLASS:

- 60, Power Plants, subclasses 39.76+ for an intermittent combustion type of combustion product generator disclosed solely for use for powder production.
- 137, Fluid Handling, subclasses 624.13+ for a timer or programmer controlled fluid handling system of general utility providing for a repeating cycle.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 99+ for a fluid sprinkling or spraying device of general utility with means causing intermittent interruption of supply to the distributing means and subclass 101 for a sprinkling device of general utility with means for fluctuating flow or pressure of fluid supplied to it.
- 251, Valves and Valve Actuation, subclasses 48+ for a fluid retarder or timer for a valve that may produce a pulsed feeding.
- 441, Buoys, Rafts, and Aquatic Devices, subclass 13 for a flashing aquatic buoy.

- 2** This subclass is indented under the class definition. Processes pertaining to: burning fuel, operating a burner, or starting combustion.

SEE OR SEARCH CLASS:

- 110, Furnaces, subclasses 341+ for methods of operating refuse incinerators and solid fuel furnaces.
- 137, Fluid Handling, subclasses 3+ for a process not specialized to combustion for the mixing of plural fluids of diverse characteristics or conditions.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 1+ for a process of sprinkling, spraying or diffusing a fluid (e.g., fuel) not specialized to combustion.
- 588, Hazardous or Toxic Waste Destruction or Containment, appropriate subclasses for the operation of a burner and the starting of combustion using as a fuel hazardous or toxic waste

wherein destruction of the waste is an objective of the process.

- 3** This subclass is indented under subclass 2. Processes involving (1) the addition of a cleansing or decarbonizing substance to the fuel; (2) a procedure that eliminates or prevents the formation of carbon and other deposits in the burner; or (3) clearing residual or undesired matter (e.g., vapor) out of a burner assembly.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 29+, for the automatic control of scavenger means.
- 32, for the automatic control of cleaning means.
- 121+, for combustion apparatus with cleaning, purging or scavenging means.

SEE OR SEARCH CLASS:

- 44, Fuel and Related Compositions, subclasses 300+ for a liquid fuel admixed with anti-oxidants, corrosion inhibitors, gum inhibitors, stabilizers, preservatives in general etc.
- 137, Fluid Handling, subclasses 15.01 through 15.26 for a process of cleaning, repairing, or assembling.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclass 9 for a fluid sprinkling, spraying or diffusing process not requiring combustion involving dissolving or mixing a material in a flowing liquid stream and combining the stream with air, gas or steam.

- 4** This subclass is indented under subclass 2. Processes including feeding a substance to the flame additional to the normal fuel and oxidizing material to act as a protective agent or to give the flame some special characteristic.

SEE OR SEARCH CLASS:

- 44, Fuel and Related Compositions, subclasses 300+ for a liquid fuel composition that may include a flame modifying additive.
- 48, Gas: Heating and Illuminating, subclasses 89+ for a retort generating heating or illuminating gas fed with steam or water, and subclasses 204+ for a heating or illuminating gas process involving water or steam.

- 60, Power Plants, subclass 775 for a combustion products generating process involving the addition of steam or water to the combustion products.
- 126, Stoves and Furnaces, subclass 59.5 for an orchard device generating smoke by combustion.
- 5** This subclass is indented under subclass 2. Processes of burning combustible constituents remaining in the gaseous waste effluent of an industrial or power plant or process.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 202, for the structural installation of a combustion device that may use waste gas as fuel, e.g., flare burner, etc.
- SEE OR SEARCH CLASS:
- 60, Power Plants, subclasses 272+, for the handling or treatment of the exhaust of an internal combustion engine.
- 422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 198+ for a furnace that may be used for such purification.
- 423, Chemistry of Inorganic Compounds, subclasses 210+ for purifying or separating gases by chemical reaction and note especially 212+ for exhaust gases.
- 6** This subclass is indented under subclass 2. Processes involving: (1) initial supplying of burner feed; (2) ignition of fuel; or (3) steps bringing about termination of combustion.
- SEE OR SEARCH CLASS:
- 60, Power Plants, subclasses 776 through 777 for a process of ignition of a combustion products generator disclosed solely for use in power production.
- 7** This subclass is indented under subclass 2. Processes of injecting fuel into a bed of refractory material or a porous refractory member and burning it therein or adjacent its surface.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 170, for a furnace in which combustion takes place in a permeable mass.
- 326+, for a porous capillary, particulate or sieve-like flame holder.
- 8** This subclass is indented under subclass 2. Processes involving the manner in which the feed is discharged into the region where combustion takes place, or the manner in which the flame is shaped into a pattern.
- 9** This subclass is indented under subclass 8. Processes in which the shaping of the flame or distributing the components includes (1) whirling the combustion components within the combustion zone; or (2) directing removed or burning material towards or into the incoming feed.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 115+, for combustion product return structure.
- 173, for feed projected tangentially to the wall of a circular combustion chamber.
- 10** This subclass is indented under subclass 8. Processes including the step of supplying a distinct stream of an oxidizer, such as air, into a burning mixture of fuel and oxidizer.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 351, for a flame holder including means feeding air at axially spaced points of the flame.
- 11** This subclass is indented under subclass 2. Processes of heating either the fuel or oxidizer prior to its discharge into a combustion zone.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 36+, for the automatic control of the burner feed heating structure.
- 161+, for a furnace heated furnace feed line.
- 207+, for a heated feed line section feeding a flame holder.

SEE OR SEARCH CLASS:

- 48, Gas: Heating and Illuminating, subclasses 197+ for a process for the mere generation of heating or illuminating gas.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclass 13 for a process of sprinkling, spraying or diffusing not specialized to combustion including heating or cooling of the sprayed material.
- 12** This subclass is indented under subclass 2. Processes controlling the supply of fuel or air discharged into the combustion zone.
- SEE OR SEARCH CLASS:
- 137, Fluid Handling, subclass 6 for a process comprising controlling the mixing of plural fluids of diverse characteristics or conditions by the heat of combustion of the mixture.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 8+ for a sprinkling, spraying or diffusing process not specialized to combustion including the steps of mixing or combining air, gas or steam with the material to be sprayed.
- 13** This subclass is indented under the class definition. Apparatus including (1) an indicating, registering, recording or alarm means for conveying information about a condition of a combustion or combustion starting apparatus, or (2) means which permits inspection of normally hidden parts of combustion apparatus or combustion starting apparatus.
- SEE OR SEARCH CLASS:
- 116, Signals and Indicators, subclass 7 for a burglar alarm that also ignites a lamp or match; and subclasses 101+ for an alarm actuated by change in temperature, e.g., fire alarm, incubator, etc.
- 137, Fluid Handling, subclasses 551+ for a fluid handling system of general utility including an indicator, register, recorder, alarm or inspection means.
- 236, Automatic Temperature and Humidity Regulation, subclass 94 for automatic temperature and humidity regulation
- apparatus thermostatically operated and including an indicator or alarm.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 71+ for fluid sprinkling, spraying and diffusing apparatus of general utility with a signal, indicator, recorder, meter or changeable exhibitor.
- 340, Communications: Electrical, subclasses 577+ for an electrical communications system not specialized for use with a specific flame holder responsive to flame.
- 356, Optics: Measuring and Testing, subclass 315, for spectroscopic analysis apparatus and subclass 417 for flame photometers comprising a flame holder, a means for feeding a sample to the flame and flame observation means.
- 374, Thermal Measuring and Testing, subclasses 100+ for a device for measuring or testing temperature.
- 14** This subclass is indented under subclass 13. Apparatus associated with a burner having a condition responsive control and in which the indicating or inspecting means is actuated by the control to convey to the operator information concerning a condition of the burner.
- 15** This subclass is indented under subclass 14. Apparatus in which the control has (1) reached a position necessitating external intervention to start, i.e., shutdown, and the indicator informs the operator that such a position has been reached; or (2) sensed that a new start attempt is necessary and informs the operator that such an attempt is being or has been made.
- 16** This subclass is indented under subclass 15. Apparatus that: (1) responds to sensed leakage, overflow or pressure outside of a predetermined range or (2) responds to an indication by an electrical test circuit of electrical component deficiency or failure.
- 17** This subclass is indented under subclass 13. Apparatus wherein the indicator gives information concerning the position or relative movement of some part of a burner apparatus or burner control.

- 18** This subclass is indented under the class definition. Apparatus whereby (1) a control is exerted by means sensing an environmental or operating condition; (2) the time at which an actuation is performed is controlled; (3) the length of time taken to perform an operation is controlled; (4) there is means providing a sequence of events set to occur at predetermined intervals; or (5) there is a means terminating a single operation in a fixed position to restart an additional cycle, which cycle is more complex than a mere starting or stopping of a single device.

SEE OR SEARCH CLASS:

- 236, Automatic Temperature and Humidity Regulation, appropriate subclass for a residual system including a temperature modifier (e.g., burner, etc.) and a means sensing the temperature of a chamber or material acted upon by the modifier; the sensing means regulating the temperature of the chamber or material by controlling the operation of the modifier.
- 700, Data Processing: Generic Control Systems or Specific Applications, subclasses 1 through 89 for data processing control systems wherein the control system is claimed generically, and subclasses 266-274 for chemical process control or monitoring systems, particularly subclass 274 for control of combustion or heating apparatus.
- 19** This subclass is indented under subclass 18. Apparatus, in which a control of a burner element is effected in response to a sensed pressure within a chamber in which fuel is burned.
- 20** This subclass is indented under subclass 18. Apparatus in which (1) a pump or flow controller in a line by which combustion products are removed from a combustion chamber is controlled or (2) a means responsive to the position or condition of operation of such a pump or flow controller exerts a control.

SEE OR SEARCH CLASS:

- 110, Furnaces, subclasses 147+ for a draft regulator for a solid fuel furnace.

- 126, Stoves and Furnaces, subclasses 285+ for a cooking stove damper and its operator.
- 236, Automatic Temperature and Humidity Regulation, subclass 45 for the regulation of temperature by means controlling the draft of a heater.

- 21** This subclass is indented under subclass 18. Apparatus in which a control actuation results from the destruction of a heat fusible or consumable connection responsive to heat of combustion.

SEE OR SEARCH CLASS:

- 122, Liquid Heaters and Vaporizers, subclass 504.1 and 504.3 for a fusible type safety device in a boiler.
- 126, Stoves and Furnaces, subclass 287.5 for a stove having a fusible release damper.
- 137, Fluid Handling, subclasses 72+ for a heat destructible or fusible control element in a fluid handling system of general utility.

- 22** This subclass is indented under subclass 18. Apparatus wherein the sensing means is responsive to (1) the presence of gaseous combustion material outside of its normal flow path or outside of its confiner during shutdown; or (2) the presence of combustion outside of the normal combustion zone.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 16, for a control system including an indicator responsive to leakage, overflow, or abnormal pressure.
- 23** This subclass is indented under subclass 18. Apparatus in which the likelihood of damage to an element of a burner assembly, e.g., igniter, nozzle, etc. is prevented or lessened by a controlled actuation of a device that (1) moves the element relative to the flame area (2) moves a baffle shielding the element from the flame area (3) directs the flow of a cooling fluid over the element or (4) otherwise modified the transfer of heat to the element from the flame area.

- 24** This subclass is indented under subclass 18. Apparatus including structure response to a signal indicating abnormality or malfunction that is produced by an electrical circuit means which (1) tests or checks a combustion sensor and its circuit or (2) analysis a signal from a combustion sensor to distinguish a tone flame signal from a false signal.
- SEE OR SEARCH CLASS:
340, Communications: Electrical, sub-classes 514+ for an electrical communication system of general application automatically responsive to a condition having means for testing the sensor or the means conveying the signal from the sensor to a control or indicator.
- 25** This subclass is indented under subclass 24. Apparatus in which the circuit has one response to the flow of current through a gap device in the flame area when the current has been changed from alternating to direct by the rectifying effect of the flame and another response to an unrectified current which is an indication of a short circuit at the gap or some other abnormality in the sensor circuit.
- SEE OR SEARCH CLASS:
340, Communications: Electrical, subclass 579 for an electrical communication system of general utility in which a flame sensor responds to the ionization or rectification properties of a flame.
- 26** This subclass is indented under subclass 24. Apparatus in which a starting means connects a checking circuit into a flame sensing circuit as a preliminary to fuel feed and subsequently disconnects the checking circuit.
- SEE OR SEARCH CLASS:
340, Communications: Electrical, subclass 515 for the testing of an automatically responsive communications system of general utility having a test structure for the system including means simulating the condition being sensed.
- 27** This subclass is indented under subclass 18. Apparatus in which a failure to sense flame in the proving period of a start program reinitiates the start program; said apparatus including structure causing shutdown requiring reset after one or more reinitiations of the start program.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
70, for a control that provides for recycle through a proving period on the sensing of a failure of an established flame.
- 28** This subclass is indented under subclass 18. Apparatus which, on starting, provides for activation of an electrical heater for the burner or burner feed and subsequently for admission of fuel to the burner or for triggering of an igniter.
- 29** This subclass is indented under subclass 18. Apparatus wherein a timing, retarding or programming means (1) effects the operation of a device which (a) supplies a quantity of fluid other than a combustible mixture to cleanse the burner of any undesirable fluid or (b) drains or otherwise removes undesirable fluid from the burner between combustion stopping and starting; or (2) causes upon the actuation of means calling for a combustion operation a predetermined period of inaction of any fire producing elements.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
3, for processes involving decarbonizing, cleaning or purging.
- 30** This subclass is indented under subclass 29. Apparatus wherein the control provides for the operation of a mechanical impelling means to flush the burner with noncombustible material (e.g., air, steam, etc.) during the scavenging or combustion start up delay period.
- 31** This subclass is indented under subclass 30. Apparatus in which, during initiation of a combustion period, the device for moving the cleansing fluid is activated for a predetermined time prior to actuation to combustion starting position of means controlling the necessary fire

- producing elements, (e.g., fuel supplier, igniter, etc.).
- 32** This subclass is indented under subclass 18. Apparatus in which the control or actuation is of structure dislodging extraneous matter or incrustations from burner elements.
- 33** This subclass is indented under subclass 18. Apparatus including structure actuating a means to put out a burner flame other than by shutting off the fuel.
- SEE OR SEARCH CLASS:
122, Liquid Heaters and Vaporizers, sub-classes 504+ for a safety device for a steam boiler comprising an automatic extinguisher.
- 34** This subclass is indented under subclass 33. Apparatus wherein the flame is put out by a smothering cap actuated in response to tilting of the burner.
- 35** This subclass is indented under subclass 33. Apparatus including means for extinguishing the flame automatically when a predetermined portion of a candle has been consumed or when a predetermined quantity of fuel has been consumed.
- 36** This subclass is indented under subclass 18. Apparatus in which the control is of or by, a condition of heat generation or transfer structure by which fluid for supply to a combustion zone of an associated burner is heated.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
11, for a process for preheating feed.
31, for a burner having an electrical heater controlled to preheat a burner or burner feeder before attempting ignition of the burner.
- 37** This subclass is indented under subclass 36. Apparatus in which the flow of feed fluid into the feed heating structure is controlled.
- 38** This subclass is indented under subclass 37. Apparatus in which the feed admission mean is controlled by means sensing the pressure within the feed containing section of the structure.
- SEE OR SEARCH CLASS:
48, Gas: Heating, and Illuminating, subclass 106 for a retort not associated with a fuel burner regulated by the pressure of the gas either in the retort or gasometer.
- 39** This subclass is indented under subclass 37. Apparatus in which the feed admission means is controlled by means measuring the liquid level in the fuel containing section of the structure.
- 40** This subclass is indented under subclass 37. Apparatus including structure by which variation in length of a fluid containing section of the feed heating structure is utilized in the actuation of a feed admission controller.
- 41** This subclass is indented under subclass 36. Apparatus in which a means sensing a condition of the heating structure actuates a controller of the heat supply of the structure.
- 42** This subclass is indented under subclass 18. Apparatus in which a means responsive to a condition of one burner head or assembly effects or locks a control means of a second burner head or assembly.
- SEE OR SEARCH CLASS:
137, Fluid Handling, subclasses 65+ for a control subcombination of a burner assembly comprising a combustion failure responsive fuel safety cut off for a burner feed line where the subcombination does not include the flame holder fed by the controlled line.
- 43** This subclass is indented under subclass 42. Apparatus having an electrical spark producing means or an electrical heating element associated with one of the burners to ignite fuel supplied to the burner.
- 44** This subclass is indented under subclass 43. Apparatus in which the igniter is deenergized by a means responsive to a pressure variation in a burner feed line produced by the sensing of combustion at one of the burners.

- 45** This subclass is indented under subclass 43. Apparatus having means to open a switch to the igniter within a predetermined time after the igniter has been turned on regardless of the condition of the burner.
- 46** This subclass is indented under subclass 43. Apparatus in which the igniter is deenergized in response to a sensed ignition of the first burner.
- 47** This subclass is indented under subclass 43. Apparatus in which the igniter is energized or deenergized manually.
- 48** This subclass is indented under subclass 42. Apparatus in which there is a third burner and an additional sensor which controls the third burner in response to a sensed condition of the second burner.
- 49** This subclass is indented under subclass 42. Apparatus in which there are three burners, the operation of the second and third burners being under the control of a sensing means responsive to a condition of the first burner; said third burner being an igniting means for the first burner.
- 50** This subclass is indented under subclass 42. Apparatus in which: (1) the sensed failure of flame at either burner during operation will result in the cut off of fuel to the second burner; or (2) the presence of a flame at both burners must be indicated at least momentarily in the starting procedure to prevent cut off of the second burner.
- 51** This subclass is indented under subclass 42. Apparatus including means controlling the feed to the first and second burners; the means automatically cutting off the feed to both burners if the flame at the first burner is sensed as being extinguished.
- 52** This subclass is indented under subclass 51. Apparatus including valve means for the first burner that must be manually opened after shutdown to feed the first burner for reignition.
- 53** This subclass is indented under subclass 52. Apparatus wherein the valve means is a single valve in a feed line common to the burners controlling the flow of fuel to both burners.
- 54** This subclass is indented under subclass 53. Apparatus including a valve, additional to the valve controlling flow to the first and second burner, in a branch leading to the second burner; said additional valve being closed or locked in the closed position until combustion is sensed at the first burner.
- 55** This subclass is indented under subclass 52. Apparatus including a reset valve in the feed line to each burner for independent control of the burners.
- 56** This subclass is indented under subclass 51. Apparatus including a fuel conduit acting as a bypass around the valve means of the first burner, or means supplying fuel down stream of the valve means for the first burner.
- 57** This subclass is indented under subclass 42. Apparatus wherein a second burner valve means is automatically closed upon sensed extinguishment of the first burner, and the second burner valve means must be manually opened for fuel to be supplied to the second burner for reignition.
- 58** This subclass is indented under subclass 42. Apparatus wherein the first burner sensor controls the flow of actuating fluid relative to a diaphragm that operates a valve controlling flow in the feed line of the second burner.
- 59** This subclass is indented under subclass 42. Apparatus wherein the first burner sensor is an electrical type sensor; e.g., burner flame completes electrical circuit, thermocouple; magnetic valve or magnetic switch responsive to the heat of the burner, photoelectric, heat responsive resistor (thermistor) etc.
- SEE OR SEARCH CLASS:**
 137, Fluid Handling, subclass 66 for a shutdown valve in a burner feed line and a thermoelectric flame sensor which causes closing of said valve in response to sensed flame failure (e.g., main burner line and pilot sensor etc.).

- 60** This subclass is indented under subclass 18. Apparatus in which the actuation causes the starting or stopping at different times of at least two distinct burner head units or burner pots.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
18+, for a burner system in which the sensor of one burner head controls a second burner head.
- SEE OR SEARCH CLASS:
137, Fluid Handling, subclasses 119.01+ for self controlled branched flow systems of general utility involving alternate or successively substituted outflow.
- 61** This subclass is indented under subclass 60. Apparatus in which the starting and stopping of the burners is in response to changes in the fuel feed pressure.
- 62** This subclass is indented under subclass 18. Apparatus including structure providing (1) feed rate variations or modulation within the period between the initial demand actuation and the attainment of the full "run" position of the control structure; or (2) a shift from "off" to a combustion initiating feed rate, then to a running feed rate; or (3) a shift from a starting fuel or fuel mixture to a "running" fuel or fuel mixture; or (4) a shift from a starting fuel charge to a "running" combustible feed.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
29+, for a control system that feeds a scavenging fluid to the burner before starting combustion.
- 63** This subclass is indented under subclass 62. Apparatus in which the burner control structure is shifted to its normal operating condition, i.e., "run" position, by means sensing the establishment of combustion.
- 64** This subclass is indented under subclass 18. Apparatus including means responsive to the level of a body of liquid fuel or connected bodies of fuel and controlling the flow of fuel to maintain a substantially unvarying depth of liquid fuel burning at the surface of one of the bodies or on a wick extending from that body.
- SEE OR SEARCH CLASS:
137, Fluid Handling, subclasses 386+ for a liquid level responsive or maintaining system of general utility.
- 65** This subclass is indented under subclass 18. Apparatus including a controller arranged to stop the fuel supply to a liquid burner in response to an accumulation of unburned liquid fuel discharged from the combustion zone.
- SEE OR SEARCH CLASS:
137, Fluid Handling, subclasses 403+ for a fluid handling system that may be a part of a burner organization in which the liquid supplied to a vessel is cut off responsive to the weight of a predetermined accumulation of unconsumed liquid.
- 66** This subclass is indented under subclass 18. Apparatus in which a fuel feed means is controlled by a means sensing and responding to a change in the temperature of the igniter or in the rate of current flow, voltage or other electrical condition of the igniter.
- 67** This subclass is indented under subclass 18. Apparatus providing for a timed period between energization of an igniter of a burner assembly and following admission of fuel to the burner head for ignition by the igniter.
- 68** This subclass is indented under subclass 18. Apparatus including control means responsive to the temperature in a combustion zone and requiring a sensed cold condition of the combustion zone before a start or recycle attempt can be effective to feed fuel.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
29+, for a control means providing a combustion start up delay period after sensed flame failure.
- 69** This subclass is indented under subclass 18. Apparatus including a "shutdown" device for a burner actuated at the expiration of a period established by a timer or retarder means; the start of the means being correlated with the

movement of a demand controller to “start” position; and a flame responsive control effective to prevent “shutdown” by the device if flame is sensed within the period.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 15, for means indicating a shutdown or aborted start attempt.
- 27, for a control providing repeated start attempts prior to shutdown upon failure to establish combustion.

SEE OR SEARCH CLASS:

- 318, Electricity: Motive Power Systems, subclass 471 for an automatic or time delay control means responsive to thermal conditions, and subclass 480 for a similar control responsive to radiant energy, in which an electric motor is the ultimate and sole electrical device controlled.

70 This subclass is indented under subclass 69. Apparatus in which a sensing of flame failure, after the sensing of flame establishment has prevented. “Shutdown”, acts to initiate a restart attempt to be terminated by flame establishment or “shutdown”.

71 This subclass is indented under subclass 69. Apparatus in which the flame responsive control acts to de-energize the igniter upon establishment of combustion.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 46, for a structure in which a sensor of a first burner control a second burner and shuts off the igniter of the first burner responsive to the establishment of flame at the first burner.

72 This subclass is indented under subclass 18. Apparatus including structure by which feed means and a means for igniting the fed fuel are operated at different times or for different time intervals.

73 This subclass is indented under subclass 72. Apparatus including a time interval establishing means.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 45, for an igniter deenergized by a timer or retarder in a system in which the sensor of a first burner controls a second burner.

74 This subclass is indented under subclass 72. Apparatus including a sensor responsive to the presence of flame in a combustion zone controlling the igniter.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 46, for an igniter deenergized responsive to ignition of a burner and in which a sensor of this burner controls another burner.

75 This subclass is indented under subclass 18. Apparatus including a sensing means which responds to a condition within an area of combustion.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 19, for a burner control means responsive to combustion chamber pressure.
- 21, for a control responsive to a combustion destructible element.
- 24+, for a flame sensor with a checking or analyzing circuit.
- 27, for a control providing repeated start attempts prior to shutdown upon a sensed failure to establish combustion.
- 42+, for a second burner controlled by a sensor of a first burner.
- 63, for a combustion sensor providing for a shift from “start” to “run” feed.
- 68, for a control in which the sensing of a hot combustion zone condition blocks a restart attempt.
- 69+, for a control providing shutdown requiring reset on sensed absence of combustion in a proving period; and
- 74, for a system in which a flame sensor controls an igniter and fuel feeder in sequence.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclasses 65+ for a combustion failure responsive fuel safety cut off burner subcombination.
- 200, Electricity: Circuit Maker and Breakers, subclasses 136+ for a temperature controlled switch that may be a burner element.
- 236, Automatic Temperature and Humidity Regulation, subclasses 9+ for an automatic temperature central device responsive to temperature changes at a burner and in the apartment to be heated; subclass 11 for a hot air furnace in which the fire and the flow of heating air through the air chamber of the furnace are controlled; subclass 14 for a device regulating a fire under a boiler according to conditions in the combustion chamber and in the boiler; subclasses 15+ for the regulation of a fire according to conditions in the furnace; subclasses 21+ for a control for a boiler having a safety cut off for the heating means responsive to abnormal boiler conditions or to the failure of the heating means (e.g., fire, etc.); and subclasses 95 and 96 for automatic control of temperature by a flue or heater attached thermostat.

- 76** This subclass is indented under subclass 75. Apparatus in which the control is by a means analyzing the composition of or responding to the relative quantity of a material formed in the combustion area, e.g., carbon or CO² in combustion gases, etc.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclasses 23.2+ for apparatus for gas analysis.
- 200, Electricity: Circuit Makers and Breakers, subclass 61.03 for a smoke responsive switch.
- 324, Electricity: Measuring and Testing, appropriate subclass for apparatus for testing the electrical properties of gases.
- 422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclasses 83+ for chemical gas analysis apparatus.

77

This subclass is indented under subclass 75. Apparatus in which the sensor responds to combustion failure or overheat to actuate a means terminating combustion and so disabling the burner that external intervention is necessary for restart.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 15, for means indicating shutdown or aborted start attempt.
- 51+, for a system in which a sensor of a first burner cuts off itself and a second burner upon sensed failure of combustion of the first burner.
- 69+, for shutdown requiring reset by sensed absence of flame in a proving period.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclasses 65+ for a fluid handling system that may be a part of a burner organization, having a flow control device in a feed line to a burner where a burner controlled by the device is not included and which device is automatically actuated to discontinue feed responsive to a temperature drop; and subclass 457 for a line condition change responsive safety cutoff valve of general utility that requires reset.

78

This subclass is indented under subclass 77. Apparatus in which the combustion terminating structure includes electrical means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 24+, for a shutdown control including an electrical test circuit sensing malfunction of a combustion sensing circuit.
- 59, for an electrical or magnetic sensor of a first burner controlling a second burner.
- 66, for a system in which a sensor of the electrical condition or temperature of an igniter controls the feed of fuel.

SEE OR SEARCH CLASS:

- 307, Electrical Transmission or Interconnection Systems, subclass 117 for a residual electrical interconnection

- system responsive to light, heat, vibratory or radiant energy.
- 323, Electricity: Power Supply or Regulation Systems, subclass 294 for a residual electrical control in which an impedance responsive to a thermal condition is between the electrical source and the load.
- 331, Oscillators, subclass 66 for an electrical system including an oscillator and a useful output for the oscillator and in which means responsive to temperature, or radiant energy in the form of light modifies a current characteristic of the oscillator.
- 338, Electrical Resistors, subclasses 22+ for an electrical resistance variable in response to temperature changes.
- 340, Communications: Electrical, subclasses 577+ for a flame responsive indicating system; and subclasses 584+ for a temperature responsive indicating system.
- 361, Electricity: Electrical Systems and Devices, subclasses 161+, 170+, and 211 for a thermally controlled electrical circuit for a relay or electromagnet.
- 374, Thermal Measuring and Testing, subclasses 179+ for a current generating sensor or thermometer, per se.
- 79** This subclass is indented under subclass 78. Apparatus in which the sensor is a means responsive to electromagnetic waves produced by the burner flame.
- SEE OR SEARCH CLASS:
- 200, Electricity: Circuit Makers and Breakers, subclass 61.02 for a light responsive switch.
- 250, Radiant Energy, subclasses 206+ for a residual photocell controlled circuit and subclass 215 for a photocell combined with a diverse type device.
- 318, Electricity: Motive Power Systems, subclass 480 for an automatic or time delay control means responsive to radiant energy in which an electric motor is the ultimate and sole electrical device controlled.
- 361, Electricity: Electrical Systems and Devices, subclasses 173+ and 211 for an electric circuit having a photocell
- device in which the final element is an electro-magnet or a relay.
- 80** This subclass is indented under subclass 78. Apparatus in which the sensor is a means which converts energy produced by heat of combustion into electrical energy.
- SEE OR SEARCH CLASS:
- 136, Batteries: Thermoelectric and Photoelectric, subclasses 200+ for a thermoelectric generator; particularly subclasses 217+ for a thermoelectric generator operated by a burner acting merely as the heat source for the generator.
- 137, Fluid Handling, subclass 66 for a valve controlled by a combustion sensor of the thermoelectric type where the burner acting on the combustion sensor is not controlled by the valve.
- 361, Electricity: Electrical Systems and Devices, subclass 162 for an electrical circuit controlled by a thermoelectric device which the final element is an electromagnet or a relay.
- 374, Thermal Measuring and Testing, subclasses 179+ for a current generating type thermometer.
- 81** This subclass is indented under subclass 77. Apparatus including a burner feed line with a valve biased toward closed position which, when manually opened, is held in the open position by a holding means which is released by a means sensing establishment of combustion at the burner; the valve thereafter being under the control of a means sensing overheat or failure of combustion at the burner.
- 82** This subclass is indented under subclass 77. Apparatus including means to supply fuel to a burner fuel line down stream of a controlled burner shutdown valve.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 56, for a system in which a sensor of a first burner cuts off feed to a first and second burner, said system having a by-pass around the cut off valve to supply the first burner or having an additional supply of fuel for the first burner.

83 This subclass is indented under subclass 77. Apparatus including a shutdown valve acted upon by a continuously applied force tending to move it toward closed position, the valve being held open against the force, by a restraining means (e.g., catch, brake, etc.), and the restraining being released by the sensor to free the valve for movement by the biasing force.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

52+, for a manually reset cut-off valve that cuts off two burners simultaneously.

84 This subclass is indented under subclass 83. Apparatus in which the restraining means is a catch device that holds the valve open by projecting into a notch or cavity and releases the valve upon withdrawal.

85 This subclass is indented under subclass 84. Apparatus wherein the catch is released by a force produced by the expansion or contraction of a confined fluid in the sensor.

86 This subclass is indented under subclass 18. Apparatus including (1) a time measuring device that is manually started and causes actuation of a control device at the expiration of a selected period or (2) a clock device that actuates a control at a desired time of the day.

SEE OR SEARCH CLASS:

110, Furnaces, subclass 192 for refuse incinerators or solid fuel furnaces provided with a timer control.

126, Stoves and Furnaces, subclass 285.5 for a timer controlled damper.

137, Fluid Handling, subclass 624.21 for a fluid handling system not specialized to combustion controlled by a clock alarm mechanism.

236, Automatic Temperature and Humidity Regulation, subclass 46 for an automatic temperature or humidity control system with a timing element.

239, Fluid Sprinkling, Spraying, and Diffusing, subclass 70 for a fluid discharge device not specialized to combustion with a preset timer for cutting off discharge.

251, Valves and Valve Actuation, subclasses 48+ for a fluid dash pot controlled valve or for a fluid controlled valve timer.

87 This subclass is indented under subclass 86. Apparatus actuating means for (1) producing a spark, (2) striking a match, or (3) combining ingredients which ignite when mixed.

88 This subclass is indented under subclass 18. Apparatus in which the operation of the burner is effected by a means which is responsive to tilting, jarring, or mechanical damage of the burner.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

22, for a burner controlled by a means sensing gas leakage, flashback or escaped flame.

34, for a wick cover type extinguishing means actuated in response to tilting of a burner assembly.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 38+ for the control of a fluid handling system of general utility by change of position or inertia of the system.

222, Dispensing, subclass 500 for gravity or inertia actuated outlet elements for dispensers.

89 This subclass is indented under subclass 18. Apparatus in which a means sensing the condition in or of burner feed structure exerts a control.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

36+, for control of or by the temperature of, pressure of, or liquid level in heated feed means.

61, for the sequential of plural burners by fuel feed pressure variations.

64, for a level responsive means which controls the fuel level in a wick pot or in a pot type burner.

65, for means cutting off the flow of fuel by collected fuel overflow.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 455+ for a line condition change responsive valve of general utility.

90

This subclass is indented under subclass 89. Apparatus in which the means sensing the condition in one burner feed line controls the flow of a second to the burner.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 87.01+ for a fluid handling system not specialized to combustion or fluid emission in which flow in one feed line is proportional to or correlated with that in a second flow line by movable means in one of the lines responsive to means sensing a variable condition in the other.

239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 61+ for a fluid handling system with a flow modifying fluid emitter not specialized to combustion having movable means responsive to some variable condition in a first fluid which causes a change in a second fluid flow or in a control means, to maintain the relative amounts thereof in a selected ratio.

91

This subclass is indented under the class definition. Apparatus including means for hurling a slug or forming a propelled rod of liquid or gelled fuel unmixed with oxidizer and igniting the surface of the slug or rod as it leaves the hurling or propelling means.

SEE OR SEARCH CLASS:

239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 67+ for a dispenser with selectively preset flow cut off means.

99

This subclass is indented under the class definition. Apparatus in which the fuel is in the form of an elongated solid piece of magnesium.

SEE OR SEARCH CLASS:

102, Ammunition and Explosives, subclasses 337+ for a parachute flare.
362, Illumination, subclasses 3+ for a photographic light.

100

This subclass is indented under the class definition. Apparatus comprising a lace-like hood or envelope of thin, porous, refractory material which, when positioned in a flame, incandesces.

SEE OR SEARCH THIS CLASS, SUBCLASS:

326+, for a porous, capillary, particulate, screen or sieve-like flame holder, e.g., radiant burner, etc.

347+, for an incandescing or reflecting burner component.

SEE OR SEARCH CLASS:

8, Bleaching and Dyeing; Fluid Treatment and Chemical Modification of Textiles and Fibers, appropriate subclasses for miscellaneous methods of treating textiles to chemically modify the same combined with a coating, lubricating or sizing of the textile.

112, Sewing, subclasses 173+ for devices for shirring and threading in the supporting loop.

118, Coating Apparatus, appropriate subclasses for coating apparatus, per se.

206, Special Receptacle or Package, subclass 68, for receptacles for shipping mantles.

252, Compositions, subclass 492 for processes of making an incandescent mantle which involves no more than preparing or regenerating the composition of which the mantle is composed.

264, Plastic and Nonmetallic Article Shaping or Treating: Processes, appropriate subclass for nonmetallic article making or shaping process of general utility.

427, Coating Processes, subclass 159, for processes of producing an incandescent mantle by a coating process.

101

This subclass is indented under subclass 100. Apparatus including mounting structure of resilient construction that alternates the transmission of shock or vibration to the supported mantle.

102 This subclass is indented under subclass 100. Apparatus including a wick positioned adjacent the mantle and means by which fuel vapors evaporated from the wick by mantle heat are directed into the mantle.

103 This subclass is indented under subclass 100. Apparatus in which a fuel or air mantle feed line is heated either by an auxiliary heater or by heat conducted or radiated from the heated mantle.

104 This subclass is indented under subclass 103. Apparatus including means forming an auxiliary fuel jet or flame holder which acts to heat the mantle feed fuel or air line.

105 This subclass is indented under subclass 103. Apparatus in which a heat receiving section of the mantle feed line is within the mantle.

106 This subclass is indented under subclass 103. Apparatus in which the heated section of the mantle feed line is directly above and adjacent to a mantle supported above and fed by an upwardly directed fuel discharge member.

107 This subclass is indented under subclass 103. Apparatus in which the hood-like mantle is supported adjacent the heated section of the feed line with its open end facing upwardly and surrounding a downwardly discharging line terminus.

108 This subclass is indented under subclass 100. Apparatus including distinct means acting on the fuel or fuel mixture in the mantle zone to increase the pressure thereof in said zone, e.g., a separate fuel pump or jet which causes vapor flow into the mantle.

109 This subclass is indented under subclass 100. Apparatus in which the hood-like mantle is supported below the feed line terminus with its open end facing upwardly and surrounding a downwardly discharging terminus.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

107, for a downwardly fed mantle heating the feedline of the burner feeding the mantle.

110 This subclass is indented under subclass 100. Apparatus in which a hood like mantle is supported above an upwardly discharging fuel line terminus with the open end of the mantle at or adjacent the terminus.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

106, for a mantle supported above an upwardly discharging fuel line terminus in which the feed line to the terminus is heated by the mantle.

111 This subclass is indented under subclass 100. Apparatus including (1) a support or connector extending outwardly from the hood-like incandescent portion of a mantle, which support or connector is attachable to means acting to mount the mantle portion or (2) a guard or shield for the mantle.

112 This subclass is indented under subclass 111. Apparatus in which the support, connector or protector is surrounded by the mantle.

113 This subclass is indented under subclass 111. Apparatus in which the support, connector or protector is positioned on a mantle, the mouth of which faces upwardly.

114 This subclass is indented under the class definition. Apparatus including means for dampening or preventing the occurrence of noises or vibrations tending to be produced in the operation of the burner assembly.

SEE OR SEARCH CLASS:

165, Heat Exchange, subclass 69 for a resilient vibration damper isolating a heat exchanger element and subclass 136 for a heat exchanger with a thermal or acoustical blocker.

248, Supports, subclasses 560+ for resilient supports; and subclasses 637+ for machinery supports of general utility.

115 This subclass is indented under the class definition. Apparatus comprising means defining a distinct path or passage communicating with a region of combustion and through which combustion products are delivered to the feed line or to the feed inlet zone of the region.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 9, for a method of whirling, recycling material, or reversing flow in an enclosed flame zone.

SEE OR SEARCH CLASS:

- 110, Furnaces, subclasses 203+ for a solid fuel burning furnace in which the products of combustion either wholly or in part, are returned to the fire that produced them.
- 126, Stoves and Furnaces, subclass 79 for a heating stove provided with means for returning the products of combustion from the smoke outlet to the combustion chamber of the stove.
- 116** This subclass is indented under subclass 115. Apparatus including a wall or partition, one side of which is the boundary of a mixing chamber containing or directly feeding the initial combustion region of the combustion zone and the other side of which defines a return path or passage supplying combustion products to the mixing chamber to be mixed therein.
- 117** This subclass is indented under the class definition. Apparatus including distinct means receiving an excess quantity of liquid fuel discharged into but not used in a vaporization or flame holding structure and draining it from the structure to a region remote from the vaporization or flame holder structure.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 65, for a fuel feed cut off actuated by collected excess liquid discharged from the fed combustion zone.

SEE OR SEARCH CLASS:

- 126, Stoves and Furnaces, subclass 51 for a liquid fuel stove having a pan or receptacle supported to catch liquid fuel dripping or overflowing from a burner.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclass 103 for a nozzle carrying an apertured shield and excess sprayed material collector.

- 118** This subclass is indented under subclass 117. Apparatus in which the liquid receiving and draining means includes a drained pan positioned outside of the flame or vaporization chamber and catching unvaporized fuel as it escapes from the chamber.

- 119** This subclass is indented under the class definition. Apparatus comprising means to collect material escaping from the confines of the apparatus additional to that withdrawn through desired and intended exhaust structure.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclasses 312+ for a fluid handling system of general application with leakage or drip collecting structure.
- 165, Heat Exchange, subclass 70 for a heat exchange having leakage collecting structure.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 120+ for a spray nozzle having a waste disposal or drip collecting means.

- 120** This subclass is indented under the class definition. Apparatus including a device for scraping, cutting or brushing a wick or for facilitating the placing of a wick in or removing it from a burner during assembly or disassembly of the burner.

SEE OR SEARCH CLASS:

- 30, Cutlery, subclasses 134+ for a grip type shear combined with other structure and subclass 233 for a shear of general application with a guard, gage or guide.

- 121** This subclass is indented under the class definition. Apparatus having (1) means for cleaning or facilitating the cleaning of a part of a burner or (2) means for removing from a part of a burner feed material that has become undesirable in that part before, during, or after operation of the device.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 3, for a process of decarbonizing, cleaning or purging a burner assembly.

- 29+, for the automatic control of a scavenging period.
- 32, for the automatic control of cleaning means.
- SEE OR SEARCH CLASS:
- 137, Fluid Handling, subclasses 238+ for a fluid handling system of general utility having structure for cleaning or steam sterilization of the system.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 106+ for a sprinkling, spraying or diffusing structure of general utility having a nozzle cleaner, flusher, or drainer; subclass 575 for a nozzle with a valve controlled feed line having a filter, sifter or screen; and subclass 590 for a nozzle having an interior filter or guide.
- 122** This subclass is indented under subclass 121. Apparatus including a member supported for movement relative to structure from which it is to dislodge undesirable material.
- SEE OR SEARCH CLASS:
- 15, Brushing, Scrubbing, and General Cleaning, subclasses 104.03+ for a pipe or tube cleaner of general application.
- 137, Fluid Handling, subclasses 242+ for a fluid handling system of general application having a mechanical cleaning means.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 114+ for a nozzle having a solid scraping or clearing member.
- 362, Illumination, subclass 458 for a hand implement for clearing out or freeing the discharge opening of a burner tip.
- 123** This subclass is indented under subclass 122. Apparatus wherein the movably mounted member moves through a feed flow control or discharge orifice.
- SEE OR SEARCH CLASS:
- 137, Fluid Handling, subclasses 244+ for a fluid handling system in which a mechanical cleaning member reciprocates in a passage.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 117+ for a nozzle of general utility in which a scraping or clearing member moves through the spray opening.
- 124** This subclass is indented under the class definition. Apparatus having a special compartment to store replacement flints for a pyrophoric igniter.
- 125** This subclass is indented under the class definition. Apparatus comprising a burner or igniter structure shaped to have the appearance of another product or article (e.g., an artificial candle, a gas flameholder in the form of a fire-log, a candle holder in the shape of a flower, etc.).
- SEE OR SEARCH CLASS:
- 42, Firearms, subclasses 54+ for a toy made to imitate a firearm and which fires an explosive (e.g., cap, etc.) by means of some sort of lock.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclass 211 for a fluid discharge device imitating the appearance of some animate or inanimate object.
- 362, Illumination, subclasses 392+ for a light support formed to resemble a candle or adapted to be enclosed in a cylindrical casing resembling a candle.
- 428, Stock Material or Miscellaneous Articles, subclasses 15+ for a three-dimensional imitation or "treated" natural product.
- 446, Amusement Devices: Toys, subclass 22 for a spark-producing toy.
- 126** This subclass is indented under the class definition. Apparatus with ornamental forms, surface ornamentation or an additive or additive means producing flame coloration.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 4, for a burning method including feeding a flame modifying additive to a flame.
- 125, for a burner or igniter structure shaped to have the appearance of another product or article.

- SEE OR SEARCH CLASS:
- 44, Fuel and Related Compositions, subclass 603 for a solid fuel composition with combustion improver, and subclass 641 for a solid fuel combustion improving compositions.
- 356, Optics: Measuring and Testing, subclass 315 for spectroscopic apparatus and subclass 417 for flame photometers comprising a flame holder having means for adding a flame coloring sample combined with a flame observing or analyzing means.
- D23, Environmental Heating and Cooling; Fluid Handling and Sanitary Equipment, subclasses 318+ for the ornamental design of a boiler or oil burner; and subclasses 403+ for the design of a gas, oil, or vapor stove or log.
- 127** This subclass is indented under the class definition. Apparatus including a torch having a fuel absorbing material and being separately mounted on a structure including an igniter or igniter element, the torch being removed from the structure for use.
- 128** This subclass is indented under subclass 127. Apparatus wherein the igniter includes an electrical spark producer or an electrically heated means.
- 129** This subclass is indented under the class definition. Apparatus including structure forming a movable section of a chamber enclosing a flame holder or a cap for a flame holder, and means by which action of an igniter is correlated with movement of such section or cap.
- 130** This subclass is indented under subclass 129. Apparatus with means to operate a valve controlling flow of fuel through a feed passage leading to the burner head along with the cover and igniter.
- 131** This subclass is indented under subclass 130. Apparatus in which a flow controlling element of the valve is interconnected for movement with the cover and igniter by means including a movable section of a conduit forming a flame holding section of the feed passage.
- 132** This subclass is indented under subclass 129. Apparatus wherein the igniter is an electrical spark producing means or an electrical resistance element.
- 133** This subclass is indented under subclass 129. Apparatus in which the movable section drives or is driven by a structure dispensing and firing a match, pellet, or percussion cap to ignite the flame holder.
- 134** This subclass is indented under subclass 129. Apparatus in which the actuating movement of an igniter element or its operator frees a cover or cap held closed against a biasing force.
- 135** This subclass is indented under subclass 129. Apparatus wherein the cover or cap is releasably latched in position upon being forced closed against bias, the biasing force acting to open the cover or cap and to actuate the igniter upon release of the latch.
- 136** This subclass is indented under subclass 135. Apparatus in which the igniter includes a flint and an abrasive wheel; the wheel being coaxial with the hinge of the cover or cap and mounted to rotate with the cover or cap as it moves toward open position.
- 137** This subclass is indented under subclass 129. Apparatus wherein upon actuation of the ignition mechanism, energy is first stored by suitable means, e.g., a spring, etc., and then suddenly released to quickly actuate an abrasive member.
- 138** This subclass is indented under subclass 129. Apparatus wherein a hinged cover or cap and a rotatable abrasive wheel are mounted to move about a common axis.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 136, for a burner igniter assembly in which the release of a biasing force results in the rotation of a cover and abrasive wheel about a common axis.
- 139** This subclass is indented under subclass 138. Apparatus wherein an operating member, e.g., finger piece, etc., is connected with the cover

- by interlinking means providing for relative movement of the cover and operating member.
- 140** This subclass is indented under subclass 139. Apparatus wherein the interlinking means between the operating member and the cover includes a gear driven by a rack, ratchet or another gear.
- 141** This subclass is indented under subclass 129. Apparatus wherein the igniter includes an abrasive wheel which is rotated in one direction only by a drive between it and the cover or cap.
- 142** This subclass is indented under the class definition. Apparatus in which either a flame holder or an igniter is detachably secured to a discrete fuel receptacle by means of a frame or casing, extending about or clasping the fuel receptacle.
- 143** This subclass is indented under subclass 142. Apparatus wherein the fuel receptacle includes a means for dispensing fuel to a combustion zone, and a means to initiate combustion of the fuel is attached to a frame or casing which in turn holds the fuel receptacle in a position adjacent the means to initiate combustion.
- 144** This subclass is indented under the class definition. Apparatus having distinct structure other than a fuel feed termination or flame size control element stopping or preventing combustion on, or ignition of, a flame holder (1) by capping or covering the flame holder, (2) by cutting off the oxygen from the fuel or flame, (3) by cooling the burner head below the combustion temperature of the fuel, or (4) by positively withdrawing fuel from contact with the oxidizer.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 33+, for a timer, programmer or condition responsive controlled burner extinguishing means.
- SEE OR SEARCH CLASS:
- 30, Cutlery, subclass 131 for a combined candle snuffer and wick trimming shears.
- 122, Liquid Heaters and Vaporizers, subclasses 504+ for a closed water heater with a fire extinguishing type of safety device.
- 169, Fire Extinguishers, appropriate subclass for a residual extinguisher of general application or one peculiarly adapted for use with or inseparable from a structure other than a fuel burner.
- 145** This subclass is indented under subclass 144. Apparatus using either a liquid or gas to cool, smother, or blow out the flame.
- 146** This subclass is indented under subclass 144. Apparatus comprising structure movably or removably mounted with respect to a flame holder section of a burner assembly forming an enclosure, plug, or cap for enclosing, sealing, or embracing the flame holder, which structure renders the burner nonusable when in one position and exposes the flame holding section to the atmosphere, e.g., oxidizer, when in another position.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 34, for a snuffer responsive to tilting of a burner.
- 129+, for a movable flame holder cover with an interrelated igniter.
- 251, for a flame enclosure movably mounted for access.
- 147** This subclass is indented under subclass 146. Apparatus wherein the cover, when in closed position, prevents access of air to, and consequent ignition by, a catalyst.
- 148** This subclass is indented under subclass 146. Apparatus wherein the flame holder cover is mounted on a support for a lamp chimney surrounding the flame holder or on the chimney itself.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 34, for a snuffer actuated in response to tilting of a burner assembly.
- 149** This subclass is indented under subclass 146. Apparatus in which a distinct flame snuffing member is enclosed or encased by the flame holder cover structure when the cover structure is in its closed position.

150 This subclass is indented under subclass 146. Apparatus in which movement of the cover operates an additional means cutting off, causing, or adjusting flow of feed fluid to the flame holder.

SEE OR SEARCH THIS CLASS, SUBCLASS:

130+, for a cover operatively related with a feed control device and with an igniter.

151 This subclass is indented under subclass 146. Apparatus wherein the burner cover encloses or caps the top of a windshield mounted about the burner.

152 This subclass is indented under subclass 146. Apparatus wherein the cover is hinged to a fuel container or supply.

153 This subclass is indented under the class definition. Apparatus including means correlating the operation of a burner assembly feed control or power supply with movement of a burner assembly component into or out of a disarranged position.

154 This subclass is indented under the class definition. Apparatus including (1) a distinct device or means for repairing an existing burner, which device usually becomes a part of the burner or; (2) a distinct device or means serving to enhance the ease or safety of repairing, removing, replacing, or assembling an element of a burner; the device or means being a distinct structure added to but not essentially a part of the burner and being more than a joint, hinge or releasable connector of the burner.

155 This subclass is indented under subclass 154. Apparatus in which the means or device is a support on which a burner or burner element is slid or rolled into or out of operative position.

156 This subclass is indented under the class definition. Apparatus which by relative rearrangement of its parts or by the addition or omission of a part is so changed as to become (a) basic subject matter of this class of a different character or having a different mode of operation or (b) basic subject matter of another class.

157 This subclass is indented under the class definition. Apparatus including a combustion chamber that has at its outlet distinct structure, which in the performance of its intended function, establishes or maintains a pressure within the combustion space distinctly above or below the pressure of the ambient which pressure is critical in the operation of the apparatus.

(1) Note. A gravity type exhaust flue is not by itself considered to establish a pressure critically distinct from the pressure of the ambient.

SEE OR SEARCH THIS CLASS, SUBCLASS:

19, for a burner having a control responsive to combustion chamber pressure.

20, for automatic control of or by an exhaust damper or pump.

SEE OR SEARCH CLASS:

110, Furnaces, subclasses 147+ for a device that acts directly on the products of combustion of a solid fuel burner after they leave the firebox, to affect the velocity of the products.

158 This subclass is indented under subclass 157. Apparatus in which the distinct structure comprises means forming the sole outlet from a confined combustion space, said means being a jet nozzle having a restricted throat; said restriction producing the elevated pressure in the combustion space and causing combustion products to discharge as a high speed jet.

SEE OR SEARCH CLASS:

60, Power Plants, subclasses 200.1+ for a specific combustion products generator supplying a nozzle where the sole specific disclosure is to obtain thrust.

175, Boring or Penetrating the Earth, subclass 14 for a means forming a hole in the earth by directly applying heat and in which the combustion is confined in a chamber having a restricted orifice.

239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 265.11+ for a reaction motor discharge nozzle discharging material from a chamber or mixer not specialized by structure to com-

bustion even though the chamber or mixer is nominally a "combustion chamber"; and subclasses 127.1+ for a similar reaction motor discharge nozzle with cooling structure.

- 159** This subclass is indented under the class definition. Apparatus including fuel discharging means mounted in a particular feeding relationship to a chamber structure the art term for which is "combustion furnace" the fuel discharging means being of the type adapted to scatter the fuel in the "furnace".

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 8+, for processes of flame shaping, or distributing components in a combustion zone.
- 115+, for combustion product return structure.
- 158, for means supplying fuel to a high pressure combustion chamber having a restricted outlet, and see the search notes under this subclass.
- 350+, for a flame holder having protective or flame enclosing structure.

SEE OR SEARCH CLASS:

- 60, Power Plants, subclasses 722+ for a chamber in which combustion products are generated for use in a power plant.
- 110, Furnaces, subclasses 260+ for feeding gas or oil and solid fuel to a furnace and appropriate subclasses for furnace structure with means peculiar to the combustion of solid fuel and which may include means dispersing fluid fuel into a furnace.
- 122, Liquid Heaters and Vaporizers, subclasses 23+ for a closed circuit liquid heating means heated by fluid fuel.
- 236, Automatic Temperature and Humidity Regulation, subclasses 15+ for a furnace having a control that automatically regulates its temperature.
- 237, Heating Systems, appropriate subclass, for a chamber having a heating system.
- 239, Fluid Sprinkling, Spraying, and Diffusing, appropriate subclass for a combustion chamber nominally set forth as supporting a nozzle wherein

no special relationship between a wall of the combustion chamber and the nozzle is set forth, nor any details of the combustion chamber.

- 266, Metallurgical Apparatus, subclasses 171+ and 200+ for metallurgical furnaces.
- 432, Heating, subclasses 159+, for a work heating chamber heated by combustion products generated in or fed to the work chamber and having a work holding or handling feature or structure making the device more than mere combustion apparatus.

- 160** This subclass is indented under subclass 159. Apparatus having structure by which a fluid medium additional to the furnace feed is directed in heat exchange relationship with a portion of the dispersing structure to remove heat therefrom.

SEE OR SEARCH CLASS:

- 122, Liquid Heaters and Vaporizers, subclass 6.5 and 6.6+ for a fuel disperser cooled by a closed circuit conduit containing a liquid and in which the liquid acting as the cooling fluid is not added to the burner feed nor dispersed into the combustion zone of the furnace.
- 137, Fluid Handling, subclasses 334+ for a fluid handling system of general utility with means for heating or cooling the system.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 128+ for a sprinkling, spraying or diffusing structure, per se, having means for heating or cooling the system or system fluid.
- 432, Heating subclass 174, for a material heating chamber heated by combustion therein having protective cooling means for combustion material feed structure.

- 161** This subclass is indented under subclass 159. Apparatus including a feed line section particularly shaped or located to receive heat from combustion within the furnace, and means dispersing the heated feed into the combustion chamber.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 11, for processes of heating feed to a burner or combustion chamber.
- 36+, for automatic control of or by the burner feed supply heating structure.
- 207+, for a heated line section feeding a flame holder.

SEE OR SEARCH CLASS:

- 122, Liquid Heaters and Vaporizers, appropriate subclass for boiler structure wherein only a portion of the heated fluid from the boiler is supplied to a burner or combustion chamber of the boiler. Where the entire heated fluid of the boiler is supplied to the burner or combustion chamber of the boiler, classification is in Class 431.
- 432, Heating, subclass 178, for a residual work heating furnace in which a combustion feed material is heated by the work chamber wall; and subclasses 179+, for a residual furnace having means outside of the chamber by which combustion feed material recovers heat from combustion gases that have been discharged from the chamber.

- 162** This subclass is indented under subclass 161. Apparatus including two furnace heated feed line sections, one section being fed by a fluid of one composition and the other section being fed by a fluid of another composition, and means for feeding the fluids either mixed or unmixed to the combustion chamber of the furnace.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 216+, for separate heated sections feeding disparate fluids to a flame holder.

- 163** This subclass is indented under subclass 161. Apparatus in which steam either generated or superheated in the heated section is fed to the fuel disperser to be dispersed into the combustion chamber of the furnace.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 162, for distinct furnace heated feed lines feeding disparate fluids to a furnace.

SEE OR SEARCH CLASS:

- 110, Furnaces, subclasses 188+, 199+, 296, and 297+ for apparatus feeding air and steam to a solid fuel furnace.

- 164** This subclass is indented under subclass 161. Apparatus in which an oxidizer (air) is heated in the section and directed into the combustion zone of the furnace through an opening in the furnace wall remote from any furnace wall opening which may be provided for the fuel disperser or its feed means.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 162, for distinct furnace heated feed lines feeding disparate fluids to a furnace.

- 165** This subclass is indented under subclass 164. Apparatus including one or more sections for heating an oxidizer and means for supplying the heated oxidizer to the combustion zone at a number of spaced points along the flow path of burning gases and remote from the disperser.

- 166** This subclass is indented under subclass 161. Apparatus in which an oxidizer is heated in the section and directed into the combustion chamber through the disperser or through a furnace wall opening surrounding the disperser.

- 167** This subclass is indented under subclass 166. Apparatus in which the heated section includes (1) a hollow portion of a wall of the combustion chamber of the furnace, or (2) a combustion confining wall and another wall spaced from the combustion chamber, and the section leads to the disperser to feed the heated oxidizer into the combustion chamber through or around the disperser.

- 168** This subclass is indented under subclass 159. Apparatus including a power driven disperser which rotates about an axis and discharges fuel by centrifugal force (1) at a surface spaced from the furnace wall or (2) at an annular protrusion of the furnace wall, which surrounds

the disperser and which extends in the direction of the axis of the rotation of the disperser.

SEE OR SEARCH CLASS:

239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 214+ for a slinger or splasher type fluid disperser, per se.

169 This subclass is indented under subclass 168. Apparatus including an annular rim or a group of deflectors which extends along the spaced surface or protrusion and is located adjacent the surface or protrusion to intercept projected fuel.

170 This subclass is indented under subclass 159. Apparatus including a mass of porous or spaced refractory material in the furnace and into which the disperser discharges fuel.

SEE OR SEARCH THIS CLASS, SUBCLASS:

7, for a process of combustion in a porous body or bed.
326+, for a porous, particulate or sievelike flame holder.

SEE OR SEARCH CLASS:

165, Heat Exchange, subclasses 4+ for a heat exchanger of the regenerative type.
202, Distillation: Apparatus, subclasses 122, 123, 130, 140, 143, 144, 146, and 148, for distillation apparatus using a regenerative type heating device.
432, Heating, subclass 197, for a work chamber in which combustion products heat work by contact and having particulate or liquid heat transfer medium in the chamber; and subclasses 214+, for a gas heating structure in which a heat storage mass is charged with heat for subsequent use.

171 This subclass is indented under subclass 159. Apparatus including (1) structure within the combustion chamber of the furnace distinct from the furnace walls and fuel discharge means or (2) a distinct protrusion of the furnace wall, directing the flow of the combustion materials.

SEE OR SEARCH THIS CLASS, SUBCLASS:

116, for recirculation of gases about a mixing or combustion chamber wall or baffle.
168, for a rotary disperser projecting fuel at a surrounding flange surface in a furnace.

SEE OR SEARCH CLASS:

110, Furnaces, subclasses 322+ for a furnace baffle or heat retainer.

172 This subclass is indented under subclass 171. Apparatus including structure in the combustion chamber arranged to direct burning fuel from one or more dispersers against all of the side walls of the chamber.

173 This subclass is indented under subclass 159. Apparatus including means for introducing fuel, oxidizer, or a mixture of the two into a circular combustion chamber substantially tangentially to the wall of the chamber.

SEE OR SEARCH THIS CLASS, SUBCLASS:

9, for processes of whirling the feed in a combustion zone.

SEE OR SEARCH CLASS:

110, Furnaces, subclasses 263+ for furnaces wherein fine fuel is burned in suspension, e.g., cyclone combustion, etc.

174 This subclass is indented under subclass 159. Apparatus including means to disperse spaced individual streams of fuel into the furnace.

175 This subclass is indented under subclass 174. Apparatus wherein one fuel stream is discharged into the combustion chamber in a linear path which intersects the linear path of another fuel stream.

176 This subclass is indented under subclass 175. Apparatus including (1) two or more parallel rows of fuel dispersers facing each other with each discharge axis of the dispersers of one row intersecting the discharge axis of an opposing disperser, or; (2) a plurality of fuel dispersers arranged in a circular pattern with

the axis of discharge of each disperser being in a common plane.

177 This subclass is indented under subclass 174. Apparatus wherein the fuel dispersers are positioned in a ring shaped pattern with (1) their discharge terminus directed at the surrounding side walls of the furnace, or (2) the dispersers being located immediately adjacent the side walls of the combustion chamber to form a layer of flame at the side walls.

178 This subclass is indented under subclass 174. Apparatus including a row of fuel dispersing means having parallel discharge axes; the discharge terminus of each disperser means being at an opening in the combustion chamber wall or forming an opening in the combustion chamber wall.

179 This subclass is indented under subclass 178. Apparatus including two rows of fuel dispersers which are close to each other and substantially parallel.

180 This subclass is indented under subclass 174. Apparatus including a row of fuel dispersers extending from one wall section of the combustion chamber of the furnace through the chamber to another wall section of the chamber.

181 This subclass is indented under subclass 159. Apparatus including structure for separately supplying fuel and another fluid to a single furnace wall opening; said fluids mixing either in the wall opening or after the two fluids are discharged into the furnace.

SEE OR SEARCH CLASS:

239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 418+ for sprinkling, spraying or diffusing structure, per se, with combining of separately supplied fluid streams at or beyond the terminal element.

182 This subclass is indented under subclass 181. Apparatus including an air conduit surrounding a fuel disperser and having means to direct its discharge to form spinning stream of air surrounding the dispersed fuel.

SEE OR SEARCH CLASS:

239, Fluid Sprinkling, Spraying, and Diffusing subclasses 403+ for a fluid discharger of general utility whirling one fluid prior to or at the point of addition of a second fluid.

183 This subclass is indented under subclass 182. Apparatus wherein the means for spinning the air includes a ring of spaced fins coaxial with the disperser and which remain stationary while directing the air.

184 This subclass is indented under subclass 183. Apparatus wherein the fins are pivotally mounted so that the angle at which they direct air may be changed, if desired.

SEE OR SEARCH CLASS:

239, Fluid Sprinkling, Spraying, and Diffusing, subclass 402.5 for disperser structure, per se, including combining of separately supplied fluids with adjustable whirling means.

454, Ventilation, subclasses 313+ for an air register having pivoted slats.

185 This subclass is indented under subclass 181. Apparatus including means at the wall directing the flow of fuel, oxidizer, or a mixture of the two to produce a spinning discharge into the furnace.

SEE OR SEARCH CLASS:

239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 399+ for disperser structure, per se, including combining of separately supplied fluids with whirling of fluid.

186 This subclass is indented under subclass 181. Apparatus including (1) means for mounting the fuel disperser so that its discharge terminus may be shifted to various positions relative to the furnace opening, or (2) means at the discharge terminus of the fuel disperser to vary either the fuel discharge pattern or the direction of the fuel discharged.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

189, for a disperser of a single feed mounted for movement relative to a furnace wall opening.

- 187** This subclass is indented under subclass 181. Apparatus in which the fuel and the other fluid are discharged in coaxial streams into the furnace wall opening or combustion chamber.

SEE OR SEARCH CLASS:

239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 423+ for the combining of separately supplied fluids at or beyond a disperser outlet with concurrent or concentric flow means.

- 188** This subclass is indented under subclass 187. Apparatus wherein the fluid discharged coaxially with the fuel is air supplied by a chamber surrounding the fuel disperser at the furnace wall opening and having an adjustable control means to regulate the supply of air into the chamber.

- 189** This subclass is indented under subclass 159. Apparatus including means for mounting the fuel disperser so that it may be moved to various positions relative to the furnace wall opening and for supporting it in the various positions.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

186, for plural feed means extending to a common wall opening of a furnace including a shiftably mounted disperser or adjustably positioned disperser terminal element.

- 190** This subclass is indented under subclass 159. Apparatus including a means distinct from the fuel disperser assembly for supplying air, water, or steam to the combustion chamber of the furnace.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

10, for a process of adding an oxidizer to a region of incomplete combustion.
162, for distinct heated sections feeding disparate fluids to a furnace.

164+, for a heated line feeding air to a furnace through an opening spaced from a fuel disperser opening.

351, for means feeding air at axially spaced points along combustion confining structure.

SEE OR SEARCH CLASS:

110, Furnaces, subclasses 188+, 199+, 214, 270, 288, 296, and 297+ for feeding air, water, or steam to a solid fuel furnace.

- 191** This subclass is indented under the class definition. Apparatus wherein a tube or hood distinct from the burner is provided to distribute fuel between a first burner and (1) a second burner, or (2) an externally accessible region; the fuel mixing with air within the tube or hood to form a combustible charge, which upon being ignited by the second burner or at said region, burns in the form of a flash passing through the tube to ignite the first burner.

- 192** This subclass is indented under subclass 191. Apparatus in which the fuel that burns in the flash conduit is supplied to the conduit at a point removed from the region at which the conducted flame is discharged from the conduit against the burner being ignited.

- 193** This subclass is indented under subclass 191. Apparatus in which the fuel that burns in the flash conduit is supplied to the conduit by the ignited burner through an orifice differing from any other orifices of the burner.

- 194** This subclass is indented under subclass 193. Apparatus in which the orifice of the burner that feeds the flash conduit is formed in a nipple that serves as a connector supporting an end of the flash conduit.

- 195** This subclass is indented under the class definition. Apparatus comprising a combustion chamber between two radially spaced coaxial, coextensive tubes having an outlet at its top and a fuel distributor at its bottom, one tube having multiple perforations through which air is admitted to the chamber.

- 196** This subclass is indented under subclass 195. Apparatus having associated means for aiding in putting the apparatus into operation; the

- means being (1) a pilot burner, i.e., a separately fed adjunctive burner, (2) structure additional to the fuel distributor for supplying a distinct starting charge of combustible material, or (3) an electrical heater or igniter.
- 197** This subclass is indented under subclass 195. Apparatus including a means interconnecting the combustion chamber and fuel distributor and providing for their relative movement between a normal operating position and a position exposing the interior of the distributor.
- 198** This subclass is indented under subclass 195. Apparatus in which the distributor comprises a chamber coextensive with and adjacent the end of the combustion annulus; the chamber distributing fuel into the annulus through spaced ports or through an elongated circumferentially extending restricted throat passage.
- 199** This subclass is indented under subclass 195. Apparatus including a line section feeding fuel to the distributor and which section is heated by combustion of fuel within the annulus.
- 200** This subclass is indented under subclass 195. Apparatus including a second combustion chamber formed by two radially spaced coaxial, coextensive tubes, one tube being perforated; the tubes forming one combustion chamber being radially spaced from the tubes forming the other combustion chamber to form a common combustion air supply passage between the two chambers.
- 201** This subclass is indented under subclass 195. Apparatus with an encircling baffle or shield defining a chamber or passage by which air is directed to the perforations in the tube.
- 202** This subclass is indented under the class definition. Apparatus (1) with a static constructional installation, or (2) with a particular geos:graphic feature, or (3) supported or carried by a means performing an operation external of the subject matter of this class; wherein there is included no more of the installation, feature or means than is necessary to bring out its relationship to the apparatus of Class 431.
- 203** This subclass is indented under the class definition. Apparatus including a reservoir holding a limited fuel charge with means on the reservoir serving to support and supply fuel to a flame holder, and means whereby the fuel in the reservoir is heated.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
36+, for automatic control of or by the temperature, pressure or liquid level of all heated supply line or tank.
- SEE OR SEARCH CLASS:
62, Refrigeration, subclasses 48.1+ for a device of general utility dispensing vapor from a liquefied gas storage container.
239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 135+ for a sprinkling or spraying device not specialized to combustion having means for heating the system or system fluid.
- 204** This subclass is indented under subclass 203. Apparatus including means wherein fuel from the reservoir is discharged as a high velocity stream across a flame area of an associated wick type burner.
- 205** This subclass is indented under subclass 203. Apparatus including a fuel charge receiving basin in which a fuel charge is burned to exhaustion in raising the temperature of the fuel in the reservoir to a condition for operation of the flame holder.
- 206** This subclass is indented under subclass 203. Apparatus including a distinct heat conductive member that carries heat from the combustion zone to the tank or its contents.
- 207** This subclass is indented under the class definition. Apparatus including a line feeding fluid to a flame holder and having (1) a means other than the flame at the flame holder for heating a section of the line, or (2) an arranged by which the fed flame holder heats a distinct section of the line by which it is fed or feed material while it is within the feed line.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
11, for a process of heating the burner feed.
36+, for automatic control of or by the burner feed supply heating structure.

- 103+, for a heated feed line section feeding an incandescent mantle.
- 161+, for a feed line section for a furnace heated by the furnace.
- 199, for a fuel distributor underlying a combustion annulus having air feeding perforations the feed line supplying the distributor being heated by the combustion annulus.
- 203+, for a flame holder mounted on a heated single charge fuel tank supplying fuel to the flame holder.

SEE OR SEARCH CLASS:

- 48, Gas: Heating and Illuminating, subclasses 89+ for a gas generator, per se, or for a gas generator with a burner fed by such generator combined with means for purifying, fixing or storing an unburned portion of the generated gas.
 - 122, Liquid Heaters and Vaporizers, subclass 10 for a boiler that produces steam to feed a fluid fuel burner or subclasses 13.01-19.2 for a stand boiler (e.g., water heater, etc.) that provides hot water for domestic or household use (e.g., cooking, cleaning, washing, bathing, space heating, etc.) that may be in other than a house or home (e.g., apartment building, office building, restaurant, laundry, recreational vehicle, etc.) having a fluid fuel burner and a preheater.
 - 137, Fluid Handling, subclasses 334+ for a fluid distribution system not specialized to combustion having means for heating or cooling the system or the system fluid.
 - 196, Mineral Oils: Apparatus, subclasses 104+ for mineral oil vaporizing apparatus.
 - 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 128+ for a spray device not specialized to combustion having heating or cooling means for the device or the fluid handled by the device.
- 208** This subclass is indented under subclass 207. Apparatus in which a device that changes electrical energy to heat energy is a heat source for the feed line.
- SEE OR SEARCH CLASS:
- 48, Gas: Heating and Illuminating, subclass 103 for apparatus generating gas from oil which is heated by an electrical heater and which does not feed an immediately associated fuel discharger specialized to combustion.
 - 137, Fluid Handling, subclass 341 for a fluid handling system of general utility in which the fluid is heated by an electric heating element.
 - 392, Electric Resistance Heating Devices, subclasses 386+ for electrical apparatus of general application for vaporizing a liquid and subclasses 441+ for heating a fluid.
- 209** This subclass is indented under subclass 207. Apparatus including means wherein the section and heat source are structurally connected to be relatively movable, e.g., to vary the thermal effect of the heat source on the section, or to position the heat source away from the heated section.
- 210** This subclass is indented under subclass 207. Apparatus having structure by which fluids of different compositions are fed to a common point in the heat absorbing section, either simultaneously or at different times.
- 211** This subclass is indented under subclass 210. Apparatus including means to heat one of the fluids prior to mixing it with another fluid at the common point.
- 212** This subclass is indented under subclass 211. Apparatus including means to heat the other unmixed fluid prior to feeding it to the feed line at the common point.
- 213** This subclass is indented under subclass 207. Apparatus including means for discharging heated air from the section downwardly against the surface of a body or film of liquid fuel.
- 214** This subclass is indented under subclass 213. Apparatus in which the heated air from the section is discharged downwardly at a film of liquid fuel flowing down a surface within the combustion zone.

- 215** This subclass is indented under subclass 207. Apparatus including means by which the heated line section receives its heat at a region remote from the combustion area from combustion products flowing through a conduit extending from the immediate combustion area and directing the products to the heated section.
- SEE OR SEARCH CLASS:
432, Heating, subclasses 179+, for a residual material heating furnace in which fuel is burned and in which the chamber exhaust heats combustion material being fed to the chamber.
- 216** This subclass is indented under subclass 207. Apparatus including two heated feed line sections, one supplying a fluid of one composition and the other supplying a fluid of a different composition either directly or through a mixer to a common combustion zone.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
162, for distinct heated feed line sections feeding disparate fluids to a furnace.
- 217** This subclass is indented under subclass 216. Apparatus in which the two fluids are fed to the combustion zone through a device in which they are intermingled.
- 218** This subclass is indented under subclass 207. Apparatus including an open topped, liquid tight, receptacle located in proximity to a feed line and in which liquid fuel is burned to heat the feed line, the feed line delivering the feed either to the combustion zone of the receptacle or to an additional flame holder.
- 219** This subclass is indented under subclass 218. Apparatus wherein water is heated in the section above its temperature of vaporization and including means to deliver the heated water (steam) from the heated section to the combustion zone of the receptacle or into the fuel in the receptacle.
- 220** This subclass is indented under subclass 218. Apparatus including a line feeding heated fuel to a flame holder and another line for feeding fuel to the fuel receptacle.
- 221** This subclass is indented under subclass 220. Apparatus in which the basin fuel feed line and flame holder fuel feed line are connected to a common main fuel line and the basin fuel feed line includes a valve to control the flow of fuel to the basin independently of the flow to the flame holder.
- 222** This subclass is indented under subclass 218. Apparatus in which the receptacle is positioned to receive liquid drip or drainage from the discharge end of the fuel line feed by the heated section.
- 223** This subclass is indented under subclass 222. Apparatus with a deflector adjacent the discharge terminus of the fuel line and mounted to be moved into and out of a position directing the fuel discharged into the receptacle.
- 224** This subclass is indented under subclass 222. Apparatus in which the heated feed line section is a horizontally extending hollow wall section of the receptacle.
- 225** This subclass is indented under subclass 222. Apparatus including a valve for controlling the flow of fuel through the heated section and the basin being mounted on the valve body.
- 226** This subclass is indented under subclass 222. Apparatus in which the heat absorbing section of the fuel line is a vertically extending cone or a drum shaped structure positioned above the terminus of the fuel line and in which the receptacle is subjacent the terminus.
- 227** This subclass is indented under subclass 222. Apparatus wherein the heated fuel line section extends vertically through the fuel basin.
- 228** This subclass is indented under subclass 227. Apparatus in which the fuel line extends vertically through the basin and discharges over surrounding means forming one or more passages descending to a flame holder or discharge terminus immediately above the basin.
- 229** This subclass is indented under subclass 227. Apparatus in which the receptacle is relatively long in one dimension and parallels an overlying horizontally extending conduit that forms the heat absorbing section of the fuel line.

- 230** This subclass is indented under subclass 207. Apparatus including a first liquid fuel burner having a capillary mass conveying liquid fuel from a source to its heated feed line section, and a second distinct burner for heating the feed line section of the first burner.
- 231** This subclass is indented under subclass 207. Apparatus including a liquid supply container, a line feeding such liquid to a first burner, a second burner heating the feed line of the first burner, and a line by which gas from the space above the liquid in the container is supplied to the second burner.
- 232** This subclass is indented under subclass 207. Apparatus in which a feed line section heated by the fed flame holder is also heated by a second flame holder; e.g., the initial vapor for an oil vapor burner is generated by a gas burner and the continuing vapor by the oil vapor burner.
- 233** This subclass is indented under subclass 207. Apparatus in which a portion of the material that has been heated in the heat absorbing line is fed to a burner heating the line and another portion is fed a means discharging externally or to a separate burner.
- 234** This subclass is indented under subclass 233. Apparatus including a group of similar burners (e.g., cooking stove burners etc.), all of which are fed by the heated feed line section and one of which heats the heated section.
- 235** This subclass is indented under subclass 233. Apparatus in which the heated line feeds gas produced or generated therein to a line heating burner and to a line supplying a heating or illuminating gas distribution system.
- 236** This subclass is indented under subclass 207. Apparatus in which the heat absorbing section is heated by a burner not fed by the heated section.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
104, for an incandescent mantle feed line heated by a discrete flame holder.
218+, for a fuel basin heating the feed line section of a disparate flame holder.
- 232, for a feed line section heated by distinct flame holders, one fed by the section.
- 237** This subclass is indented under subclass 236. Apparatus including a line feeding the heat absorbing section and a branch line connected ahead of the heated section supplying the burner which heats the section.
- 238** This subclass is indented under subclass 207. Apparatus including means whereby unheated fuel is supplied either (1) directly to the flame holder or (2) to the line delivering feed to the flame holder downstream of the heated section.
- 239** This subclass is indented under subclass 238. Apparatus in which feed from the heated section of the feed line is discharged as a high velocity stream through (1) a suction device to pick up unheated fuel, or (2) an atomizing device to which the unheated fuel is supplied for atomization.
- SEE OR SEARCH CLASS:
239, Fluid Sprinkling, Spraying, and Diffusing, subclass 138 for a fluid sprinkling or spraying device of general application with heating means for the sprayed fluid and in which two fluids are discharged through a single terminal outlet, one fluid aspirating the other.
- 240** This subclass is indented under subclass 207. Apparatus in which the heat absorbing section has within it and in the flow path of the fuel (1) means holding back or separating any entrained solids from the fuel; or (2) means spreading out the fuel, guiding it or transmitting heat to it; or (3) wick means.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
230, for an auxiliary burner which heats a wick within a heated feed line section for another burner.
- 241** This subclass is indented under subclass 240. Apparatus including a fuel tank and wick means for lifting liquid fuel from the tank to the heated section by capillary action.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 230, for a liquid fuel burner having a wick in its feed line and heated by an auxiliary burner.
- 242** This subclass is indented under subclass 207. Apparatus in which a flame area through which the heated section of the feed line passes is defined by a casing forming part of a flame holder assembly and spaced from the heated section.
- 243** This subclass is indented under subclass 207. Apparatus in which the heat absorbing section of the feed line is shaped to form, is within, or is heat conductively arranged along, wall structure of an enclosure that directs or confines the flame.
- 244** This subclass is indented under subclass 207. Apparatus including a burner head having plural distinct orifice or sets of orifices that receive the feed from the heated section of the fuel line; one of the distinct burner orifices or sets of orifices being arranged to heat the fuel line and another being otherwise directed.
- 245** This subclass is indented under subclass 207. Apparatus including structure by which unheated oxidizer is mixed with the feed from the heated line section and the mixture passes through a line or manifold to a terminus of the flame holder discharging to the combustion zone heating the feed line.
- 246** This subclass is indented under subclass 245. Apparatus wherein the heated section is located within a wall of the flame holder.
- SEE OR SEARCH CLASS:
 239, Fluid Sprinkling, Spraying, and Diffusing, subclass 132.5 for a sprayer of general utility in which a heat exchange fluid in the terminal element is, or is added to the spray fluid.
- 247** This subclass is indented under subclass 207. Apparatus in which the feed line is a conduit within or passing through the flame area fed by the conduit.
- 248** This subclass is indented under subclass 247. Apparatus with a means directing the flow of flame or products of combustion from the burner to or around the heated feed line section.
- 249** This subclass is indented under the class definition. Apparatus including a chamber, chimney, or shield forming a flame enclosing zone and having distinct means additional to the normal combustion material supply or exhaust structure by which passage to or from the zone may be had, or by which the interior of the zone may be exposed; e.g., an ignition or cleaning port, etc.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 129+, for a movable burner head cover and interrelated igniter.
 146+, for a movably or removably mounted burner cover.
 153, for the correlation of burner fuel or power supply with component movements (e.g., door opening, etc.) in a disabling and enabling sequence.
 186, for a furnace having a fuel and air disperser shiftably mounted in a wall opening of a furnace.
 189, for a fuel disperser adjustably mounted for movement relative to a furnace wall opening.
 191+, for a burner ignited by a flash flame through a conduit.
 197, for a perforated combustion annulus mounted for access to an underlying annular fuel distributor.
- 250** This subclass is indented under subclass 249. Apparatus including a flame enclosure and a match scratcher located within the enclosure adjacent the access or exposure means for striking a match to light the flame holder.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
 270, for a cap, match or pellet igniting charge holding and firing structure within a flame enclosure that has an externally accessible charge firing operator.

- 251** This subclass is indented under subclass 249. Apparatus including means wherein the combustion zone enclosing means can be moved relative to the remainder of the apparatus to give access to the enclosed zone.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 197, for a combustion annulus having air feeding perforations movably mounted for access to an underlying fuel distributor.

SEE OR SEARCH CLASS:

- 362, Illumination, subclasses 174+ for a tubular lantern with a globe operator.

- 252** This subclass is indented under the class definition. Apparatus having an appurtenance associated with a flame holder such that when air is drawn or blown through the appurtenance by a device or person at intervals, as desired, the flame held by the holder will be extended or deflected by the moving air.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 8+, for a process of flame shaping.
204, for a fuel jet from a heated tank traversing a wick burner.

SEE OR SEARCH CLASS:

- 239, Fluid Sprinkling, Spraying, and Diffusing subclasses 290+ for a sprinkling or spraying structure of general utility with a supplemental gas shaping or shielding jet; and subclasses 398+ for a sprinkling or spraying structure not specialized by structure to combustion with combining of separately supplied fluid streams.

- 253** This subclass is indented under the class definition. A combustion or combustion starting device as defined in the ... (1) combined with an additional feature or structure having a function other than combustion or combustion starting; or (2) combined with additional structure serving to perfect the operation of the combustion device or combustion starting device.

- (1) Note. The features and structures mentioned in (1) Note of the class definition

as part of a fuel discharger device specializing it to this class are not regarded as additional features or structures for classification in this "combined" subclass.

- (2) Note. The combined features or structures function other than as a support, handle or as a portion of a combustion fluid supply structure. For example, search this class subclass 295 for a holder for plural candles; 296 for a hook clamp or spike supported candle holder; subclasses 320+ for a wick type burner having a liquid fuel tank; subclass 343 for a flame holder with a supporting bracket, leg, hook, strap, or clip, subclass 344 for a flame holder-fuel tank assembly; and subclass 345 for a flame holder having an attached handle.

SEE OR SEARCH CLASS:

- 206, Special Receptacle or Package, subclasses 85+ for a tobacco container with an igniter for said content.

- 254** This subclass is indented under the class definition. Apparatus having means conjointly activating a burner feed means and a structure by which mechanical or electrical energy is utilized to create a fuel ignition in the combustion zone of the fed burner.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 28, for the automatic control of the sequence of operation of a feed heater and feed flow controller or igniter.
67, for igniter heat up and fuel feed sequence controlled by a timer or retarder.
72+, for a condition responsive control of an igniting and fuel feeding sequence.
130+, for correlated action of an igniter, fuel feed valve and burner cover.

- 255** This subclass is indented under subclass 254. Apparatus including, as a part of a unitary burner assembly, structure which creates the electrical energy for the igniter from some other form of energy.

SEE OR SEARCH CLASS:

- 219, Electric Heating, subclass 268 for an igniter of the resistive element type with a source of power or current.
- 361, Electricity: Electrical Systems and Devices, subclasses 258+ for an electrical igniter having an electromechanical generator.

256 This subclass is indented under subclass 254. Apparatus in which a portion of a valve controlling burner feed, or the mechanical means by which the valve is activated, acts to close an electrical circuit in which the igniter is connected.

257 This subclass is indented under subclass 256. Apparatus wherein an element or operator means of the valve acts to move one electrode relative to another electrode of the igniter so that the electrodes come into brushing contact or break with each other to create a spark.

258 This subclass is indented under the class definition. Apparatus in which an electrical heating means, e.g., resistance coil, spark, etc., raises a fuel oxidizer mixture to ignition temperature or supplies heat to a combustion area of a burner.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 28, for an automatically controlled electrical feed preheater and igniter.
- 128, for a common support for an electrical igniter and a hand torch.
- 196, for an electric combustion starter for a burner having a fuel distributor underlying a combustion annulus having air feeding perforations.
- 208, for an electricity heated burner feed line section.

SEE OR SEARCH CLASS:

- 89, Ordnance, subclasses 28.05+ for an electrical firing device for ordnance.
- 102, Ammunition and Explosives, subclasses 202.5+ for a fuse, primer or igniter utilizing electrical energy for firing an ammunition or explosive device and subclass 322 for a blasting charge igniter fired by an electric current.

219, Electric Heating, subclasses 260+ for a resistive element type electrical igniter, per se.

221, Article Dispensing, subclasses 143+ for an article dispenser having article treating means including an electrical igniter.

361, Electricity: Electrical Systems and Devices, appropriate subclasses under subclass 247 for an electrical igniting system.

259 This subclass is indented under subclass 258. Apparatus including an electrical heater which heats the feed material and a spaced electrical means for igniting the heated material.

260 This subclass is indented under subclass 258. Apparatus including an electrical means positioned adjacent structure collecting or holding a pool or film of liquid fuel, said electrical means vaporizing a portion of the fuel from the structure and igniting it.

261 This subclass is indented under subclass 260. Apparatus in which the structure is a wick or a porous solid capable of holding fuel by capillary action in the vicinity of the electrical means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 128, for a commonly supported electrical igniter and removable hand manipulable torch.

262 This subclass is indented under subclass 261. Apparatus wherein the igniter is an electrical resistor which reaches a temperature, when energized, which is sufficient to ignite the fuel.

263 This subclass is indented under subclass 258. Apparatus having means forming an auxiliary combustion chamber or distinct zone with an electrical igniter located in proximity to the main flame zone of the burner to ignite the fuel forming the main flame but located to the side of or in a by-pass of the direct blast or the main flame or main flame feed stream.

264 This subclass is indented under subclass 258. Apparatus including an electrode of a spark gap device positioned adjacent a fuel discharge

nozzle or in front of it to ignite the discharged fuel.

SEE OR SEARCH CLASS:

313, Electric Lamp and Discharge Devices, a subclasses 118+ for a spark device, per se.

265 This subclass is indented under subclass 264. Apparatus including an air blast tube surrounding the fuel discharge nozzle, and delivering air to the discharged fuel at the nozzle, and having structure supporting the electrode within the air blast tube.

266 This subclass is indented under subclass 264. Apparatus in which the fuel discharge nozzle serves as an electrode or forms a necessary link conducting electricity to an immediately associated electrode of the spark gap device.

267 This subclass is indented under the class definition. Apparatus by which igniting heat is produced by means converting mechanical energy into heat energy, by a catalyst, or by means mixing chemicals that react at low temperature and become heated to ignition temperature by released heat of reaction.

SEE OR SEARCH CLASS:

44, Fuel and Related Compositions, subclasses 507+ for a match, per se.
131, Tobacco, subclass 185 for a smoking device combined with an igniter; subclass 234 for an igniter or match scratcher combined with a tobacco ash receiver; and subclass 249 for a cigar end cutter combined with an igniter or match scratcher.
149, Explosive and Thermic Compositions or Charges, appropriate subclass for an explosive or thermic composition or charge, e.g., match composition, etc.
206, Special Receptacle or Package, subclasses 85+ for a tobacco container with an igniter for said content.

268 This subclass is indented under subclass 267. Apparatus in which the combustion initiating temperature is produced by the flow of an air and fuel mixture across a catalytic member.

SEE OR SEARCH THIS CLASS, SUBCLASS:

147, for a burner having a catalytic flame holder or igniter and an extinguishing cover for stopping combustion.
326+, for a porous, capillary or particulate flame holder.

SEE OR SEARCH CLASS:

422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, subclass 122, 139+, 171, 177+, 190, and 211 for apparatus for carrying out a chemical reaction in which a catalyst is used.
502, Catalyst, Solid Sorbent, or Support Therefor: Product or Process of Making, for a composition comprising a catalyst, per se.

269 This subclass is indented under subclass 267. Apparatus comprising structure by which a held charge of combustible mixture that bursts into flame when subjected to friction or percussion is fired by being moved or struck, said charge being in the form of a cap, match, or pellet.

SEE OR SEARCH THIS CLASS, SUBCLASS:

87, for a timer controlling a combustion initiating means, e.g., match striker etc.

SEE OR SEARCH CLASS:

42, Firearms, subclasses 54+ for a device made to imitate a firearm and which fires an explosive, e.g., a cap, etc., by means of some sort of hammer.
102, Ammunition and Explosives, subclass 204 and 205 for an igniting device specialized to the igniting of an explosive device of Class 102; subclass 322 for a blasting cap; and appropriate subclass for a cartridge or cap type explosive charge or device, per se, with or without an electrical heater, that may be used as an igniter.
206, Special Receptacle or Package, subclasses 98+ for a match safe wherein a match is ignited by withdrawal from the safe.

- 221, Article Dispensing, subclasses 137+ for a dispenser having a match striker, particularly subclass 139 for a device in which the manual removal of a match causes it to be struck.
- 312, Supports: Cabinet Structure, subclass 86 for a cabinet with a dispensing magazine for matches and having means for igniting the dispensed match.
- 446, Amusement Devices: Toys, subclasses 398+ for a cap exploding toy other than one which simulates a fire-arm.
- 270** This subclass is indented under subclass 269. Apparatus in which mechanical energy to fire a charge positioned within a flame enclosure is supplied by an energy transmitting structure, said structure being released or activated by a means accessible from without the enclosure.
- 271** This subclass is indented under subclass 269. Apparatus containing or supporting a plurality of charges and having means dispensing or holding separate one charge from the other charges and said means including structure providing for the firing of the separated charge.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
133, for a solid ignition charge dispenser and striker correlated with the motion of a flame holder cover.
- 272** This subclass is indented under subclass 271. Apparatus including means by which charges linearly spaced along a strip or joined end to end by interconnectors between each two charges are successively advanced to the firing structure.
- 273** This subclass is indented under subclass 267. Apparatus in which an element and a member having an abrasive surface are rubbed together to project particles heated to igniting temperature by friction.
- SEE OR SEARCH CLASS:
420, Alloys or Metallic Compositions, subclass 416 for rare earth metal base alloys which are useful for producing sparks, i.e., so-called "flints".
- 446, Amusement Devices: Toys, subclasses 22+ for a spark-producing toy.
- 274** This subclass is indented under subclass 273. Apparatus including a mounting structure for the element, a mounting structure for the abrasive surface and a slidable or pivotal means distinct from the mounting structure to move the abrasive surface relative to the element.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
129+, for a burner head cover operatively interrelated with an igniter, most of which are of the mechanically operated abrasive type.
- 275** This subclass is indented under subclass 274. Apparatus wherein energy is stored in the means for moving the abrasive member, e.g., a spring etc., and a means is included to suddenly release the stored energy to cause the abrasive member to move over the element.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
136, for a burner in which the release of a latch frees a cover to spring open and rotate an abrasive wheel; and subclass 137 for the quick activation of an abrasive member by release of stored energy correlated with burner cover motion.
- 276** This subclass is indented under subclass 273. Apparatus in which the element, e.g., flint, is mounted on or within a holding device, the apparatus having structure by which the element is translated or rotated relative to the holding device.
- 277** This subclass is indented under subclass 273. Apparatus wherein both the element and the abrasive member are supported by a fuel tank which supplies fuel to a burner being lighted by the projected particles from the element.
- 278** This subclass is indented under the class definition. Apparatus including two flame holding structures or sections physically related to each other, one of said structures or sections being operable independently of the other because of, (1) independent fuel supplies, or (2) a distinct separately actuatable controller or valve pas-

sage regulating the discharge to one of the structures or sections.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

191+, for one burner igniting another by flash of flame through a conduit.

220, for burner assembly having a feed line for one flame holder heated by a separately supplied pot type burner.

236+, for a feed line for one burner heated by an auxiliary burner.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 599.01+ for a fluid handling system dividing a flow stream into parallel paths with recombining (e.g., pilot and main flame paths feeding a burner etc.).

239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 444+ for a fluid discharge system of broader application having valving means controlling flow to selective terminal outlets.

279 This subclass is indented under subclass 278. Apparatus wherein one flame holding structure has a movable connector upon which it may be rotated, pivoted or slid relative to another flame holding structure, e.g., into or out of igniting relationship etc.

280 This subclass is indented under subclass 278. Apparatus in which the feed to the distinct flame holding sections is under the control of a single valve element having one or more grooves or passages that coacts with a valve seat to control the feed to one of the flame holder sections independently of that to another.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 625+ for an arrangement in which a multiway valve unit controls flow in a fluid handling system of more general application.

281 This subclass is indented under subclass 278. Apparatus having separate controllers for two flame holding sections that are interconnected by structure providing common or interlocked operation.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

42, for the control or actuation of plural burners in which the sensor of one burner controls another; and subclass 60+ for the sequential operation of plural burners by a time, program or condition responsive actuator.

282 This subclass is indented under subclass 278. Apparatus in which one of the flame holders is a wick that has an adjusting structure by which it may be independently controlled.

283 This subclass is indented under subclass 278. Apparatus in which one of a plurality of flame holding sections is positioned to be ignited by a second section and to ignite a third section.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

48, for a control system in which a sensor of a first burner controls a second burner and a sensor of the second burner controls a third burner; and

192, for a flash igniting conduit having a feed means for the conduit spaced from the ignited burner.

284 This subclass is indented under subclass 278. Apparatus wherein the fuel feeder discharges fuel at its terminus in a pattern coaxial of or surrounding the discharge terminus of the other fuel feed.

SEE OR SEARCH CLASS:

239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 448+ for a sprinkling or spraying device not specialized to combustion having selectively usable or variable diverse terminal elements one of which discharges centrally of another.

285 This subclass is indented under subclass 278. Apparatus forming a burner head assembly that has as a part thereof means forming an enclosed or shielded combustion space fed by both sections.

286 This subclass is indented under the class definition. Apparatus including a distinct means providing an exposed combustible mixture in a

- zone extending from one distinct flame holding area of a burner head or section to another distinct burner head or section.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 191+, for a burner ignited by a flash flame through a conduit; and
- 283, for three separately supplied or controlled burners mounted in cross igniting relationship.
- 287** This subclass is indented under the class definition. Apparatus with means additional to the normal combustion structure (1) for preparing a burner for lighting or (2) for interaction with a source of igniting temperature in the initiation of combustion of fuel in a burner being put into operation.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 196, for means supplying a priming charge to a combustion annulus.
- 288** This subclass is indented under the class definition. Apparatus including (1) a unit comprising a wick or other capillary fuel conveying structure on which fuel burns imbedded in a meltable solid fuel, e.g., wax etc., which is melted by the heat of the burner flame and is fed to the flame by the wick; or (2) structure peculiarly adapted for use with such a unit.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 35, for an extinguishing device controlled by means responsive to a change in candle length or fuel quantity.
- 125, for a simulation which may be a candle simulating another article, or a liquid fuel burner simulating a candle.
- 126, for a combustion device, e.g., candle etc., with added ornamentation.
- SEE OR SEARCH CLASS:
- 44, Fuel and Related Compositions, subclass 275 for a candle composition.
- 264, Plastic and Nonmetallic Article Shaping or Treating: Processes, appropriate subclass for a process of molding a candle.
- 362, Illumination, subclasses 190+ for an electric lamp simulating a candle.
- 425, Plastic Article or Earthenware Shaping or Treating: Apparatus, subclasses 117+ for apparatus for casting candles.
- 289** This subclass is indented under subclass 288. Apparatus including (1) a candle or taper combined with structure additional to the wick and fuel of the candle or taper, or (2) a device peculiarly adapted for use with a candle or taper.
- SEE OR SEARCH CLASS:
- 248, Supports, subclasses 511+ for a support of general utility for staff type objects.
- 362, Illumination, subclasses 161+ for a lantern using a candle, and subclass 447 for a shade or bowl supported on a candle.
- 290** This subclass is indented under subclass 289. Apparatus including structural means provided to (1) maintain the flame of the burning candle or taper at a constant elevation, or (2) adjust the height of the burning portion of the wick to a desired position in a candle support.
- 291** This subclass is indented under subclass 289. Apparatus including a surrounding casing or wall extending the full length of the solid fuel body.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 290, for a candle having a height adjusting or flame level maintaining device, e.g., a candle enclosing sleeve within which the candle is advanced as the fuel body is consumed etc.
- SEE OR SEARCH CLASS:
- 362, Illumination, subclasses 161+ for a lantern having a chimney and in which the light source is usually a candle.
- 292** This subclass is indented under subclass 289. Apparatus in which the additional device includes structure particularly adapted to act upon, receive or direct the flow of candle material liquefied by the heat of the flame.

293 This subclass is indented under subclass 292. Apparatus including a device for encircling the flame end of the candle and holding melted material adjacent the flame zone; the device being supported by the candle material adjacent the flame and sliding down along the candle as the supporting candle material is consumed by the flame.

294 This subclass is indented under subclass 292. Apparatus comprising a melt receiving receptacle carrying a candle grasping or socket means; the grasping or socket means having drainage structure or being of spaced elements providing for escape or drainage of the melt to the receptacle.

295 This subclass is indented under subclass 289. Apparatus wherein the device is a holder adapted to support a plurality of candles or candle flame sections erect and spaced apart.

SEE OR SEARCH CLASS:

248, Supports, subclasses 512+ for a support of general utility for plural staff type objects.

296 This subclass is indented under subclass 289. Apparatus including a candle holder and a hook, clamp, or spike for securing it to an external structure.

SEE OR SEARCH CLASS:

7, Compound Tools, subclass 104 for a candlestick provided with a spike supported holder, combined with a tool such as a knife blade, fuse capper, etc.

297 This subclass is indented under subclass 289. Apparatus comprising a unitary structure having a portion for engaging and retaining a candle and another portion for engagement and retention by a candlestick socket.

298 This subclass is indented under the class definition. Apparatus including a fibrous and flexible, cord, tape or tube; one end of which forms a flame holder; and that by capillary action draws up and feeds to the flame holder a steady supply of liquid fuel.

(1) Note. A claim to a wick by name only, in terms of material, but no structure peculiar

to a wick is considered to be a claim to a sorbent for Class 502. Woven material is not considered peculiar to a wick but a specific weave is structure peculiar to a wick.

SEE OR SEARCH THIS CLASS, SUBCLASS:

34, for a wick cover actuated in response to tilting a burner.
102, for a wick feeding vapor to a mantle.
282, for an adjustable wick burner physically related to another burner.
288+, for a candle or taper, i.e., a wick impregnated with or embedded in a body of wax.

SEE OR SEARCH CLASS:

239, Fluid Sprinkling, Spraying, and Diffusing subclasses 44+ for a slow diffuser spreading material into the air by vaporization from a wick removing liquid from a holder, and subclass 145 for a porous or external wick discharge of material.
502, Catalyst, Solid Sorbent, or Support Therefor: Product or Process of Making, subclass 1 for a sorbent claimed as having thermal conductivity and subclasses 400+ and 526 for a sorbent which may be used as a wick.

299 This subclass is indented under subclass 298. Apparatus including a device holding a body of liquid of a different material than the fuel fed to the wick adjacent to the zone heated by the wick flame, or feeding such liquid to the zone heated by the wick flame.

300 This subclass is indented under subclass 298. Apparatus including apparatus supplying a distinct stream of pressurized air to the combustion area of a flame holding structure.

SEE OR SEARCH THIS CLASS, SUBCLASS:

252, for a burner with adjunctive means to extend the flame by air blast or aspiration.

301 This subclass is indented under subclass 298. Apparatus for limiting the upward or downward movement of a wick in its support, or for

- restraining the wick from unintentional movement.
- 302** This subclass is indented under subclass 298. Apparatus in which the wick is tubular in section at the flame zone and is supported by structure forming an air passage to the interior of the tubular wick through which air is supplied to the flame zone.
- 303** This subclass is indented under subclass 302. Apparatus wherein (1) the wick has a lateral air inlet or (2) one or more wicks are folded or positioned adjacent each other to form a tubular wick section at the flame zone and to form a lateral air inlet to the central air passage.
- 304** This subclass is indented under subclass 302. Apparatus including means for moving the wick section into or out of the flame zone and relative to its support.
- 305** This subclass is indented under subclass 304. Apparatus wherein the means for moving the wick includes a helical section attached to the wick which acts with a portion of the support to elevate the wick.
- 306** This subclass is indented under subclass 304. Apparatus wherein the means for moving the wick includes a screw in which structural means moves upon rotation of the screw, and the structural means engages the wick for movement relative to the support.
- 307** This subclass is indented under subclass 304. Apparatus wherein the means for moving the wick includes structural means forming a rack and engaging the wick, and a pinion meshing with the rack for reciprocating the rack and wick in a longitudinal direction.
- 308** This subclass is indented under subclass 304. Apparatus wherein the means for moving the wick includes structural means attached to the wick and having a bar, the bar being movable in a longitudinal direction for raising and lowering the wick.
- 309** This subclass is indented under subclass 302. Apparatus including structure in addition to the interior air passage for directing or distributing air into the flame zone of the wick.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
195, for a combustion annulus having air feeding perforations above a fuel distributor, e.g., wick etc.
- 310** This subclass is indented under subclass 298. Apparatus including a directing device at the upper end of the wick shielding the flame or establishing the size, shape or character of the flame by controlling the flow of air relative to the wick.
- 311** This subclass is indented under subclass 310. Apparatus including a member made of transparent or translucent material through which the wick projects.
- SEE OR SEARCH CLASS:
362, Illumination, subclasses 312+ for a transparent lamp chimney which may act as an air guide or distributor.
- 312** This subclass is indented under subclass 310. Apparatus including means forming a plurality of passages each surrounding the wick or flame zone of the wick and each directing a distinct stream of air at all sides of the flame zone.
- 313** This subclass is indented under subclass 310. Apparatus including plural distinct elongated air passages leading to distinct regions of the wick flame zone.
- 314** This subclass is indented under subclass 310. Apparatus including means forming an air passage surrounding the wick or flame zone of the wick and having a discharge annulus adjacent the flame zone.
- 315** This subclass is indented under subclass 298. Apparatus including structure for (1) moving the wick relative to a support or guide; or (2) varying the capillary action of a wick section or size of fuel conveying passages in or at the wick to control fuel flow therethrough.
- 316** This subclass is indented under subclass 315. Apparatus including a supported means having radial projections, e.g., a toothed wheel, which engages the wick to raise or lower it etc.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:
304+, for a wick raiser for a tubular wick.
- 317** This subclass is indented under subclass 316. Apparatus including a transmission mechanism such as a coupling, linkage, gear train, or rack and pinion for moving the rotatably supported means.
- 318** This subclass is indented under subclass 316. Apparatus including two rotatably supported means for engaging and moving the wick being positioned on opposite sides of the wick and having parallel axis.
- 319** This subclass is indented under subclass 298. Apparatus including a fuel supply reservoir, and a wick support that is remote from the fuel reservoir and in communication therewith by a discrete fuel feed line.
- 320** This subclass is indented under subclass 298. Apparatus in which a reservoir containing a fuel supply carries means holding a wick extending inwardly and outwardly of the reservoir.
- SEE OR SEARCH CLASS:
15, Brushing, Scrubbing, and General Cleaning, for brushing and scrubbing implement of the wick type having a supply holder.
222, Dispensing, subclass 187 for a wick type dispensing device.
239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 44+ for a slow diffuser including a wick extending from a liquid reservoir.
- 321** This subclass is indented under subclass 320. Apparatus including (1) distinct means forming a passage through a wall of the reservoir serving as a vent for the reservoir; or (2) means distinct from the wick guide or support opening for filling the reservoir.
- SEE OR SEARCH CLASS:
141, Fluent Material Handling, With Receiver or Receiver Coating Means, appropriate subclass for means specialized for filling a container with a fluent material.
- 322** This subclass is indented under subclass 320. Apparatus including discrete structure for holding or supporting the wick guide or support on the container when in a removed position.
- 323** This subclass is indented under subclass 320. Apparatus including (1) structure distinct from, and in addition to, the normal wick support for supporting a section of the wick; (2) structure restraining or directing the flow or movement of fluid within the reservoir; or (3) absorbent material within the reservoir feeding fuel to the wick by capillary action.
- 324** This subclass is indented under subclass 320. Apparatus including a removably mounted closure member for the container and means forming a passageway extending through the closure and filled with and supporting the wick.
- 325** This subclass is indented under subclass 298. Apparatus in which the fibrous and flexible cord, tape, or tube (1) has a surface covering in the form of a coating; (2) is impregnated with a material other than fuel; (3) is made up of layers of diverse materials; (4) is made up of two distinct connected sections; or (5) has as an integral part of the wick an attached or embedded strengthening, supporting or protecting structure.
- SEE OR SEARCH CLASS:
106, Compositions: Coating or Plastic, appropriate subclass for a plastic or coating composition, per se.
428, Stock Material or Miscellaneous Articles, appropriate subclasses, for a stock material product in the form of a single or plural layer web or sheet, and especially subclasses 364+ for a structurally defined or coated rod, strand, fiber or filament.
502, Catalyst, Solid Sorbent, or Support Therefor: Product or Process of Making, for a sorbent or catalyst, per se, which may serve as a flame holder material.
- 326** This subclass is indented under the class definition. Apparatus having structure traversed by fuel which burns within the structure or along its surface, said structure being (1) a mass with

interstices within which combustion takes place, (2) a discharge surface member with traversing minute passages through which fuel is supplied to the combustion zone to burn as a film thereon, or (3) a screen or screenlike means at the combustion area to which the fuel is fed.

SEE OR SEARCH CLASS:

502, Catalyst, Solid Sorbent, or Support Therefor: Product or Process of Making, for a sorbent or catalyst, per se, which may serve as flame holder material.

- 327** This subclass is indented under subclass 326. Apparatus including a porous capillary body of material, a surface of which carries the flame and the pores of which constitute a fuel storage reservoir and fuel feed passages, said body having distinct means attached thereto or a means containing it to manually carry it or support it.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

127, for a commonly supported igniter and removable hand manipulable torch.

SEE OR SEARCH CLASS:

44, Fuel and Related Compositions, subclasses 542+ for solid fuel compositions coated or impregnated for easier ignition.
362, Illumination, subclass 182 for a device for connecting a campaign torch to a staff.
502, Catalyst, Solid Sorbent, or Support Therefor: Product or Process of Making, for a sorbent or catalyst, per se, which may serve as a flame holder material.

- 328** This subclass is indented under subclass 326. Apparatus including a feed line connected to the flame holding structure for directing fuel for traversal as a fuel or combustion product through the structure and for initial combustion within or along the surface of the flame holding structure.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

7, for a process of burning fuel in a porous body or bed.
147, for a catalytic burner with an extinguishing cover.
170, for a furnace containing checker work or a permeable mass into which fuel is dispersed for combustion.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, subclasses 92+ for a stove having an incandescing, radiating, or surface combustion type flame holder.
239, Fluid Sprinkling, Spraying, and Diffusing, subclass 145 for a disperser or diffuser of general utility having a porous or external wick discharge means.

- 329** This subclass is indented under subclass 328. Apparatus wherein the flame holding structure includes a screen of interwoven refractory strands of material along the surface of which the fuel burns.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

100+, for an incandescent mantle of a woven material and on which fuel burns.

- 330** This subclass is indented under the class definition. Apparatus including (1) means forming successive drops of fuel which fall into a combustion zone, (2) means forming stepped liquid fuel surfaces within a combustion zone arranged for serial flow of the fuel as a flowing layer thereover, or (3) a sloping shelf or baffle exposed within a combustion zone fed with a liquid stream at an upper part that is formed into a layer that flows by gravity as a layer across the shelf or baffle toward a lower edge.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

214, for means directing heated air at fuel flowing down a stepped or inclined surface.

- SEE OR SEARCH CLASS:
- 222, Dispensing, subclasses 420+ a dispenser of general utility including a drop forming structure.
- 261, Gas and Liquid Contact Apparatus, subclasses 108+ for a wetted baffle type gas and liquid contact apparatus not specialized to combustion.
- 331** This subclass is indented under the class definition. Apparatus including a container confining a layer or pool of liquid fuel and having means extending above the fuel surface to confine flames and products of combustion, said confined flame and products of combustion acting to heat the upper surface of the liquid fuel to produce fuel vapor for combustion within the container.
- SEE OR SEARCH CLASS:
- 126, Stoves and Furnaces, subclass 59.5 for an orchard heater which may include a pot type burner.
- 332** This subclass is indented under subclass 331. Apparatus including means whereby a fluid other than air or fuel is held within, or discharged into the region of combustion.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 219, for a burner in which a heated line section feeds steam into a fuel basin or priming cup supplying heat to the heated line.
- 333** This subclass is indented under subclass 331. Apparatus including means for continuously replenishing the fuel as it is burned in the container.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 64, for a level responsive means maintaining a fuel level in a pot type burner.
- 195+, for a fuel distributor underlying a combustion annulus having air feeding perforations.
- 213+, for a burner having combustion immediately above a liquid fuel surface to heat an air feed line discharging against the surface.
- 218+, for a burner including a fuel basin (pot type burner) heating a burner feed line.
- 260+, for an open liquid fuel holder with an electrical heater or igniter adjacent the fuel.
- 334** This subclass is indented under subclass 333. Apparatus including distinct means by which the burner pot is moved as a whole in a vertical direction relative to its support.
- 335** This subclass is indented under subclass 333. Apparatus including a conduit extending vertically through the bottom of the fuel pot and feeding air into the pot.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 195+, for a fuel distributor underlying a perforated combustion annulus.
- 336** This subclass is indented under subclass 333. Apparatus including structure at the pot outlet forming a partial cover in the shape of a ring that forms a restricted, centrally located, upwardly facing passage for the escape of the combustion material from the pot.
- 337** This subclass is indented under subclass 336. Apparatus in which the structure making up the partial cover includes passages therein adjacent the centrally located pot discharge feeding air inwardly.
- 338** This subclass is indented under subclass 333. Apparatus having a flow director within the pot forming a tortuous passage or separated combustion regions therein.
- 339** This subclass is indented under subclass 338. Apparatus including a vertically extending baffle forming a horizontally restricted burning zone or chamber within the pot and exposed to fuel on the pot bottom.
- 340** This subclass is indented under subclass 338. Apparatus in which the structure within the pot extends across the pot and divides it into an upper and a lower chamber communicating through a central opening in the structure.

- 341** This subclass is indented under subclass 331. Apparatus with a duct forming a combustion chamber mounted on and receiving gas or vapor rising from the pot, the duct having structure by which air is supplied to and mixed with the rising gas or vapor for combustion within the duct.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
333+, for a controller, director or mixing means for the discharge from a continuously fed pot burner.
- 342** This subclass is indented under subclass 341. Apparatus having distinct means within the pot by which the flow of liquid fuel, air or combustion products is guided relative to the pot.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
338+, for baffling means within a pot burner of the continuously fed type.
- 343** This subclass is indented under the class definition. Apparatus including means supporting a flame holder and its unitarily associated elements (e.g., fuel tank etc.) relative to external structure, the means including a distinct leg, bracket, strap, hook or clip.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
296, for a candle or taper holder with a hook, clamp or spike type support.
- SEE OR SEARCH CLASS:
126, Stoves and Furnaces, appropriate subclass where the support for the flame holder has combined with it additional structure forming a stove, furnace or heater; particularly subclass 271.2 for a surface heater comprising a flame holder and means supporting it to heat a surface.
239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 273+ for a sprinkling, spraying or diffusing structure not specialized to combustion with support means.
248, Supports, appropriate subclass for a support, per se, or for a device supporting a nominally recited device
- light (e.g., light burner, etc.) in which no significant structure of the device is claimed.
- 362, Illumination, subclasses 382+ for a support for light.
- 344** This subclass is indented under the class definition. Apparatus including a vessel holding a depletable supply of fuel and a flame holder mounted on the vessel.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
91, for a "flame thrower" which may be attached to a fuel tank.
102, 103+, for incandescent mantle burners most of which include a fuel tank in combination.
129+, and 144+, for a pocket type cigarette lighter comprising a flame holder and a fuel tank.
142+, for a burner or igniter removably secured to a fuel tank by an encircling frame or casing.
203+, for a heated tank and flame holder assembly.
231, for a burner-fuel tank assembly in which the burner feed line is heated by an auxiliary burner supplied from the upper space of the tank.
241, for a fuel tank-flame holder assembly in which a wick in a heated line feeds fuel from the tank to the flame holder.
277, for a projected spark igniter mounted on a fuel tank adjacent a burner head.
298+, for a wick type flame holder which includes a fuel tank in combination.
331+, for a pot type burner assembly in which the combustion takes place at the liquid surface in a fuel tank.
- SEE OR SEARCH CLASS:
62, Refrigeration, subclasses 45.1+ for a storage container-dispenser combination specialized to the handling of a liquefied gas (e.g., butane).
126, Stoves and Furnaces, subclasses 271.1+ for a heater adapted to be moved over a surface which is to be heated; and subclasses 401+ for a burner tool having a fuel reservoir.
222, Dispensing, subclass 3 for a dispenser and a container for holding a gas to be dispensed; and appropriate

- subclass for a residual holder and dispenser of other fluids.
- 239, Fluid, Sprinkling, Spraying, and Diffusing, subclasses 146+ for a sprinkler or sprayer not specialized to combustion with mobile tank-type supply means; and subclasses 302+ for a sprinkler or sprayer not specialized to combustion with a supply holder for the material.
- 345** This subclass is indented under the class definition. Apparatus including a flame holder provided with a handle for manual movement of the flame holder.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 91, for a flame thrower which may have a handle.
- 127+, for a common support for an igniter element and a removably used hand manipulable torch.
- 289+, for a porous or capillary flame holding structure attached to a handler.
- 343, for an external bracket, leg or clip for a burner assembly.
- SEE OR SEARCH CLASS:
- 102, Ammunition and Explosives, subclasses 336+ for a pyrotechnical signalling or illuminating torch.
- 126, Stoves and Furnaces, subclasses 401+ for a hand manipulatable tool including a burner and work engager.
- 222, Dispensing, subclasses 465.1+ for a dispenser having a container handle or handgrip.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 375+ for a fluid disperser including a handle or handgrip and subclasses 525+ for a flow line or nozzle attached to, or carried by a handgrip or handle.
- 346** This subclass is indented under the class definition. Apparatus including means preventing or limiting the spread of flame from the combustion area into the fuel feed passage of a burner.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 19, for the control of a burner responsive to combustion pressure;
- 22, for the control of a burner responsive to a leakage, flashback or escaped flame sensor;
- 29+, for a timer or programmer controlled scavenging means; and
- 328+, for a burner having a porous, capillary, permeable, or sievelike member through which the fuel is delivered to the combustion zone.
- SEE OR SEARCH CLASS:
- 48, Gas: Heating and Illuminating, subclass 192 for a means for preventing or localizing and confining, explosions in a gas line or distributing system.
- 60, Power Plants, subclass 39.11 for a combustion products type power plant with a screen to prevent flash-back.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclass 432 for a sprinkling or spraying device of general utility including a device mixing separately supplied fluid streams upstream of a discharger and having a dispersing plate or obstruction in the mixing chamber, subclasses 553+ for a unitary plural outlet nozzle with an interior guide, filter or apertured member; and subclasses 590+ for a rigid terminal member having an interior guide, distributor filter or screen.
- 362, Illumination, subclasses 164+ for a lantern provided with fine screens at the openings in the lantern to prevent the flame from igniting combustible gases which may surround the lantern.
- 347** This subclass is indented under the class definition. Apparatus in which a structure within the flame region is particularly adapted (1) to reflect the radiant energy of the flame or (2) by its mass conductivity and composition to discharge radiant energy by glowing when heated.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 100+, for an incandescent mantle.
- 170, for a furnace in which fuel is dispersed into a checkwork or permeable mass which may become incandescent from the heat of the burning fuel.
- 328+, for a porous, capillary, permeable, or sievelike flame holding structure

within which or on the surface of which combustion takes place. The mass and conductivity of such structure is usually such that it incandesces.

SEE OR SEARCH CLASS:

126, Stoves and Furnaces, subclass 14 for a broiling attachment for a stove; subclass 41, for a gas stove with broiler attachment, and subclass 92, for a heating stove having members heated to incandescence by a gas burner.

348 This subclass is indented under subclass 347. Apparatus, including a concave radiating surface which is swept by flames from fuel discharged across it.

349 This subclass is indented under the class definition. Apparatus in which a flame holder has means simultaneously discharging fuel in a high velocity stream and in a supplemental lower velocity stream, the lower velocity stream acting as pilot to reignite the high velocity stream upon accidental flame out.

SEE OR SEARCH THIS CLASS, SUBCLASS:

278+, for structurally related flame holding sections, one separately supplied or controlled; and

286, for a burner having means transmitting flame between separate flame holding sections.

SEE OR SEARCH CLASS:

239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 548+, for a sprinkling, spraying or diffusing device of general utility having unitary plural outlet means in the device; and subclass 601, for a particular orifice shape for such a device.

350 This subclass is indented under the class definition. Apparatus including a fuel discharge device specialized to combustion by (1) an enclosing means forming a combustion chamber having an unmodified discharge; (2) structure protecting the discharge means or its surroundings from localized heat produced by the combustion of the discharged fuel and not of general utility for protection in the discharge

of any hot fluid; or (3) means for maintaining a steady flame.

SEE OR SEARCH THIS CLASS, SUBCLASS:

23, for timer, programmer or condition responsive control of means protecting or shielding a burner assembly element from burner heat.

248, for a heat absorbing line section with a distinct baffle directing flame relative to the section.

249+, for a flame holder including a flame enclosure providing for access to the flame zone.

270, for an enclosed flame holder with means for holding and firing a cap, match or pellet type igniting charge within the enclosure.

310+, for a wick type burner with an air guide, distributor, or shield.

338+, and 342, for baffling means within the confines of a pot type burner.

346, for a burner with flashback controlling or preventing structure.

347+, for an incandescing or reflecting component in the flame area.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 377+, for a fluid handling system of general application having a guard or shield.

239, Fluid Sprinkling, Spraying, and Diffusing, subclass 103, for a nozzle not specialized to combustion carrying an apertured shield and collector, subclasses 104+, for a sprinkler sprayer or diffuser not specialized to combustion having a soil preventing guard or shield, subclasses 132+, for a sprinkler, sprayer, or diffuser of general application having a heat exchanger in the terminal element, e.g., injection nozzle cooling, subclasses 288+, for a sprinkler, sprayer, or diffuser not specialized to combustion having a solid means as a guard or protector and subclasses 461+, for a sprinkler, sprayer, or diffuser not specialized to combustion with flow deflecting or rotation controlling means.

- 351** This subclass is indented under subclass 350. Apparatus including means for supplying air directly to burning gases at spaced points along the region of combustion in the direction of flow of the flame as it passes along or through a shield, tunnel, or chamber means.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 10, for processes of adding an oxidizer to a region of incomplete combustion.

SEE OR SEARCH CLASS:

- 432, Heating, subclasses 222+, for air heater that operates by mixing air with combustion gases.

- 352** This subclass is indented under subclass 351. Apparatus in which the means for feeding air comprises perforations through the shield, tunnel or chamber and spaced along the line of flow of the burning gases.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 195+, for a fuel distributor underlying a combustion annulus having air feeding perforations.
333+, for a pot type burner which may include perforations in its side wall for feeding air to the interior of the pot; and 341+, for a pot type burner including an exhaust flue having air feed passages.

- 353** This subclass is indented under subclass 350. Apparatus, including a barrier means encircling and extending along a flame area and forming a distinct chamber or vessel within which combustion takes place, the chamber or vessel having an unmodified discharge.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 151, for a flame holder having a wind-shield within a covered zone.
157+, for a combustion confining means maintaining a critically defined combustion pressure, and see the search notes under subclasses 157 and 158.
242, for a burner casing enclosing a heated feed line section and flame holder.

- 243, for a flame enclosing tube or sleeve that comprises or conducts heat to a burner feed line.

- 263, for a burner having an electrical igniter in an offset ignition chamber.

- 265, for a gun type burner with a spark electrode adjacent a fuel discharger and in an air blast.

- 285, for separately supplied or controlled flame holders having a common flame chamber or shield means.

SEE OR SEARCH CLASS:

- 126, Stoves and Furnaces, subclass 91 for a gas-fueled radiator-type heating stove or subclasses 360.1 and 360.2 for a submerged fluid fuel burner other than a top-accessible liquid heating vessel.

- 239, Fluid Sprinkling, Spraying, and Diffusing, subclass 499 for a spray nozzle of general utility having a flow deflecting or rotation controlling means in the form of a chamber.

- 354** This subclass is indented under the class definition. Apparatus including chamber forming means which has a shaped or internal means specialized to the mixing of fuel and an oxidizing medium, the chamber means forming a unit with an immediately adjacent flame holder.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 217, for a burner assembly in which heated diverse fluids are mixed upstream of the combustion zone.

- 239, for a burner assembly in which a heated feed aspirates unheated fuel.

- 245+, for a burner assembly in which heated fuel is mixed with unheated air and fed to a flame holder.

SEE OR SEARCH CLASS:

- 48, Gas: Heating and Illuminating, subclasses 180+, for a device mixing, heating or illuminating gas where a burner is not immediately associated with the mixing device.

- 137, Fluid Handling, subclasses 602+, for a fluid mixing means in a residual fluid handling system of general utility.

- 239, Fluid Sprinkling, Spraying, and Diffusing, appropriate subclass for a device for mixing plural fluids which are later discharged from a terminal member modifying the flow of the mixed fluids as they are discharged.
- 261, Gas and Liquid Contact Apparatus, appropriate subclass for gas and liquid contact apparatus not involving combustion.
- 417, Pumps, subclasses 151+, for a jet pump in which an aspirating fluid entrains and mixes with another fluid.
- 355** This subclass is indented under subclass 354. Apparatus comprising a vertical tube of constant cross section with a fuel gas feed means and an opening for air admission at its lower end, the fuel being fed upwardly and vertically into the tube, mixing with the air, and discharging from the upper end to burn thereabove.
- 356** This subclass is indented under the class definition. Apparatus not provided for elsewhere.
- 357 ILLUMINATING FLASH DEVICE, E.G., PHOTOGRAPHIC BULB, ETC.:**
This subclass is indented under the class definition. Apparatus having a substance which is quickly burnable to produce a burst of light for the purpose of signalling or illuminating an area.
- SEE OR SEARCH CLASS:
- 102, Ammunition and Explosives, subclasses 335+ for an explosive or pyrotechnic device in the form of a cartridge or receptacle containing powder that is ignited manually or with a fuse; and subclasses 200+ for means initiating the combustion or detonation of explosive or thermic compositions or charges.
- 149, Explosive and Thermic Compositions or Charges.
- 361, Electricity: Electrical Systems and Devices, subclasses 264+ for electrical systems, per se, for igniting incandescent means.
- 362, Illumination, subclasses 3+ for a source of visible radiant energy and means to modify the distribution of said energy and designed for use with a camera.
- 396, Photography, main class definition, for a listing of classifications for object illumination devices and subclasses 155+ for camera structure combined with illumination means.
- 358 Fuel charge within sealed transparent casing, e.g., bulb:**
This subclass is indented under subclass 357. Apparatus in which the substance to be burned is sealed within a transparent envelope, said envelope further containing the necessary atmosphere or other substance to support the burning process.
- (1) Note. This subclass includes a combustible flashbulb with a nominally claimed light modifier or reflector and see the search note below to Class 362, Illumination, for a classification for the combination.
- SEE OR SEARCH CLASS:
- 53, Package Making, subclasses 79+ and 403+ for methods of, and apparatus for, evacuating or gas filling a receptacle and closing the evacuated filled receptacle.
- 219, Electric Heating, subclass 267 for a housing, casing, or support for a resistive igniter element.
- 220, Receptacles, subclasses 2.1+ for an envelope for an electric lamp.
- 313, Electric Lamp and Discharge Devices, appropriate subclass for residual electric lamp or discharge structure.
- 362, Illumination, subclasses 3+ for a light source combined with a means adapted to perfect or modify the illumination, such as a reflector.
- 445, Electric Lamp or Space Discharge Component or Device Manufacturing, appropriate subclass for methods and apparatus for manufacturing electric lamp and electric space discharge devices.
- 359 Plurality of bulbs associated for sequential ignition:**
This subclass is indented under subclass 358. Apparatus having means interconnecting a plurality of bulbs so that (a) upon percussive actuation of a single means, a successive one of

said bulbs will be ignited, or (b) upon a single actuation of a means, a plurality of bulbs will ignite in a successive order with a predetermined time delay automatically interposed between successive ignitions, or (c) upon ignition of one of the bulbs of the sequence of bulbs, by activating an electrical means, a switch means or other electrical circuitry is conditioned so that when the electrical means is again activated, another bulb in the sequence will be ignited, or (d) a structural means provided to support a plurality of bulbs as a unit in which each bulb is provided with its own percussive ignition means.

- (1) Note. Included in this subclass are those multibulb units having a switch means which is conditioned upon the ignition of one bulb to permit ignition of another bulb by electrical means, or a unit of percussively actuated bulbs having means whereby each bulb is struck separately.

SEE OR SEARCH THIS CLASS, SUBCLASS:

358+, for devices wherein a plurality of bulbs are arranged to be fired substantially simultaneously.

360 Coated casing:

This subclass is indented under subclass 358. Apparatus having a layer of material, different from that of the envelope, on a surface of the transparent envelope.

SEE OR SEARCH CLASS:

- 106, Compositions: Coating or Plastic, appropriate subclass for a coating composition.
- 313, Electric Lamp and Discharge Devices, subclasses 110+ for an electric lamp or discharge device with an optical device or a special ray transmission envelope.

361 Percussive ignition means ignites charge:

This subclass is indented under subclass 358. Apparatus having a means which is ignited upon being struck a physical blow by a means provided therefore, said ignited means in turn ignites the quickly burnable substance to produce the burst of light.

- (1) Note. Mechanisms, per se, for striking percussively ignited bulbs are collected here where that is the sole disclosed use for the mechanism.

362 Electrically ignited primer ignites charge:

This subclass is indented under subclass 358. Apparatus having a small quantity of a substance which (a) is ignited as a result of its proximity to a resistance wire which is heated when an electrical current is passed therethrough or (b) is ignited as a result of its own electrical resistance when an electrical current is passed therethrough, whereby when said small quantity of substance is ignited, it will in turn cause the quickly burnable substance to ignite and produce the desired burst of light.

SEE OR SEARCH THIS CLASS, SUBCLASS:

358, for bulbs provided with a mere filament or wire which is heated when an electrical current is passed therethrough and which in turn ignites the quickly burnable substance.

363 Having fuel charge feeding means:

This subclass is indented under subclass 357. Apparatus having means to transfer the burnable substance from a remote area to an area where it is to be burned to produce the desired burst of light.

364 Having protective shield:

This subclass is indented under subclass 357. Apparatus having a barrier means located adjacent to the area where the light producing substance is ignited for the purpose of protecting the user from undesirable effects from the ignition.

SEE OR SEARCH CLASS:

362, Illumination, subclasses 3+ for a light source combined with a means for reflecting or directing the light rays emanating from said source.

365 Electrical means ignites charge:

This subclass is indented under subclass 357. Apparatus including an electrical spark producer or resistance heater which is arranged to ignite the burnable substance.

SEE OR SEARCH CLASS:

361, Electricity: Electrical Systems and Devices, subclasses 264+ for electrical circuitry, per se, for igniting incandescent means.

END